January 1965

Agriculture

Vol. 72 No. 1

SELECTED CONTENTS

Published for the Ministry of Agriculture, Fisheries and Food by Her Majesty's Stationery Office

1s. 3d.
MONTHLY

More time at market – while automatic machinery does the feeding.

This man is feeding his entire pig herd RIGHT NOW!

AUTOMATIC electric machinery, in fact, does the entire job for him. He merely sets the time-switch and goes away to do other jobs. It saves a lot of time and labour—in some cases up to 90% on traditional methods.

Find out more, now, from your Electricity Board, Electrical Contractor or Agricultural Machinery Dealer. Or fill in the coupon.

Electricity cuts production costs

To: Electrical Development Association (R/A/1), 2 Savoy Hill, London, WC2.

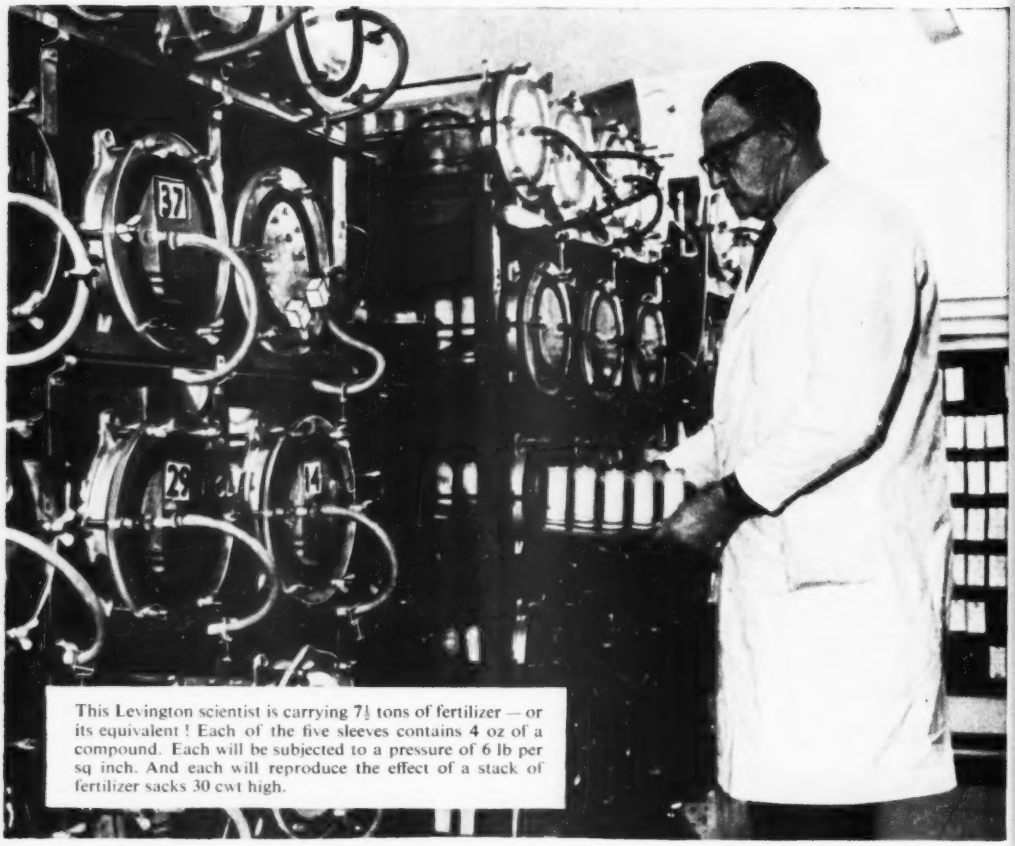
Please send me free copies of your publications giving information about Automatic Feed Preparation and Feeding by Electricity.

NAME .....

ADDRESS .....

.....

.....



This Levington scientist is carrying 7½ tons of fertilizer — or its equivalent ! Each of the five sleeves contains 4 oz of a compound. Each will be subjected to a pressure of 6 lb per sq inch. And each will reproduce the effect of a stack of fertilizer sacks 30 cwt high.

How **Fisons** stack 4 oz of fertilizer 30 sacks high

One way to test how a fertilizer will store is to store it, leave it—and see what happens. Fisons in fact, do just that before they allow a new compound anywhere near a customer's farm. But to test an experimental formulation which may only be available in small quantities, this method is not practicable. So Fisons have developed a laboratory technique to reproduce the effects of storage on a farm for long periods.

Small batches of the new compound are made in a bench granulator. Then 4-oz samples are placed in elastic sleeves, and 6 lb per sq inch air pressure applied to the outside of the sleeve, which is placed in a glass cylinder. The air inside the sleeve has free access to the atmosphere so that the applied pressure is transmitted from granule to granule as in a sack of fertilizer.

This test reproduces the pressure on the bottom sack in a stack of fertilizer 30 bags high. Throughout the laboratory test, the temperature is kept constant and the humidity controlled.

And this is how Fisons evaluate the results. Each column of compressed fertilizer is placed in an apparatus which measures the pressure needed to break it up. Compounds which need more than 10 lb per sq inch are unlikely to be satisfactory if stored for long periods. Those which need less pressure should store well. The correlation between the results obtained in this test and those obtained under farm storage has been established for a large number of different fertilizer formulations.

This test is only one stage of the screening to which Fisons subject new formulations at Levington Research Station. Compounds which pass are tested again under farm-storage conditions. In bulk stores. In stacked bags. The object of each stage of screening is the same. Fisons make sure that the fertilizers which reach the farmer do their job.

Agriculture

VOLUME 72 · NUMBER 1 · JANUARY 1965

Editorial Offices
Ministry of Agriculture, Fisheries and Food
Whitehall Place, London S.W.1. Trafalgar 7711

CONTENTS

Hurry Hurry Hurry

Buy ICI compounds this month and save 10/- on every ton

Think how much fertilizer you will need this spring. Think what you save on the January delivery rebate — 10/- off per ton. You'll find it pays to buy ICI Compounds now. ICI Compounds are packed in waterproof polythene sacks for easy storage. ICI concentration saves time, labour, storage space. Profit more with ICI Compounds — see your merchant today.

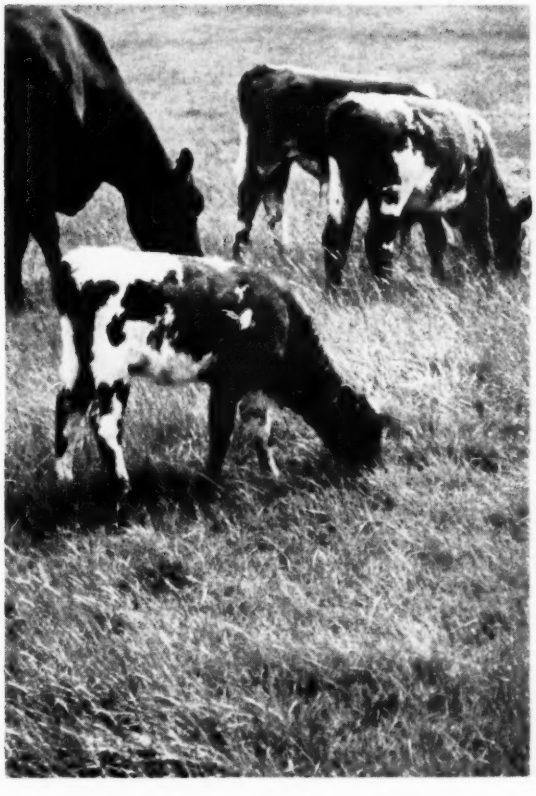
ICI NEW No. 1 (15.15.21) Ideal for potatoes, other root crops, all green crops. Recommended application rate per acre: Potatoes 8 cwt. Roots 6 cwt. Green crops 5 cwt.
ICI No. 2 (22.11.11) Specially for spring cereals—no top-dressing needed. The compound for grass too. Recommended application rate per acre: Spring barley and spring wheat 3 cwt. Oats 2 cwt. Early bite 3 cwt.
ICI No. 4 (15.10.10) Right balance for sugar beet. Recommended application rate per acre 7 cwt.

First for fertilizers ICI

AGRICULTURE JANUARY 1965

PROTECT!

Free Vaccination against Brucellosis



VACCINATION of female calves with Strain 19 vaccine is the most effective way of reducing losses caused by this disease. It gives reliable protection for at least five pregnancies.

Calves can now be vaccinated as soon as they reach four months of age and instead of being tattoo-marked in the caudal fold, vaccinated animals will be identified by a simple tag in the right ear. It is important that calves are not vaccinated too late in life, and none are eligible for the free service after they have completed their eighth month of life.

Vaccination is normally carried out by a local veterinary surgeon, and farmers will be under no obligation apart from giving him all reasonable assistance to carry out the task. The Ministry will, however, require farmers to undertake not to vaccinate any animals outside the prescribed age range without its consent.

In his own interests every herd owner should take advantage of this valuable service. Enrolment in the free calf vaccination service entails nothing more than completing a simple form which the Divisional Veterinary Officer will be pleased to supply.

. . . a new concept in sheep breeding which may well have a profound effect on the sheep industry as we know it today

The Colbred Story

DEREK BARBER • W. W. YOUNG

UNTIL recently the Colbred story has been the saga of one man: a man who made an imaginative and skilful foray against the complacency and inertia which has for overlong characterized many sections of our sheep industry. It all started back in 1953, but the first real event took place one windy day in October, 1957, when ten East Friesland sheep, thin, ill-favoured brutes with pendulous udders and rat-like tails, arrived on a Gloucestershire farm. The first chapter of the story was completed five years later, when thirty Colbred sheep were sold privately for £20,000.

Oscar Colburn, in partnership with his father, farms some thousand Cotswold acres at Crickley Barrow, Northleach. Ever since he started farming, after war service in the R.A.F., he has had an abiding interest in sheep and the sheep industry. And while he is now doing some rather unorthodox things with Hereford cattle, sheep are likely to remain his chief preoccupation.

The first task he set himself was to improve the Crickley Barrow flock of Cluns. Some simple recording had shown the wide variation in performance, mainly in prolificacy and milking ability, between one ewe and another. And so, in striking contrast to those who still clung to a childlike faith in their ability to judge sheep merely by looking at them, and others just a shade more sophisticated who based their flock management on mating twin with twin, Oscar Colburn decided to do something purposeful. He launched (for the first time in this country) a full-scale progeny testing programme for his flock, with the striking results which have been widely written about.

This, in fact, was pioneer work of a high order and its value has been fully acknowledged. But his next step, the making of the Colbred, perhaps the most important development in breeding since John Ellman improved the Southdown, may well have a profound, even perhaps a shattering, effect on the sheep industry as we know it today.

Colbred sheep on the Cotswolds

Four-way cross

The Colbred is an amalgam of Clun, Border Leicester, East Friesland and Dorset Horn. Representatives of these four breeds were crossed and re-crossed until their individual identity was lost and from the mingling of their blood emerged a so-called hybrid sheep—big, blocky, white-faced, with impressive prolificacy, milking ability and carcass and wool quality.

The object of the exercise was an improved crossing sire for mating with hill types to breed a half-bred ewe for producing fat lambs; to go one better in fact than the Border Leicester. For while the Border Leicester has proved itself, particularly in its ability to 'nick' with hill ewes, it is concentrated into remarkably small individual flocks and the scope for real improvement through selection is limited. As an ingredient for a new, improved type of crossing sire, the Border Leicester was a fairly obvious choice: it had size and prolificacy. The Dorset Horn was less obvious, but apart from its curious ability to breed out of season, its carcass quality was good enough to influence the final product without unduly depressing fertility. The Cluns were already resident at Crickley Barrow and moreover the progeny testing programme had concentrated the more prolific and worthwhile strains of a breed well proved as a fat lamb mother.

A selection of the very best of these Clun strains would mean something of known value going into the pot for the Colbred programme. But however well conducted a sheep testing programme may be, and however skilful the methods, there are well-defined limitations to breed improvement. The first is one of time: the improvement by selection within a flock can be a frustratingly slow process. For a weakly-inherited character like prolificacy, about $\frac{1}{2}$ per cent per year or 2 per cent per ewe generation is all that can be hoped for. Incidentally, if only this simple fact was recognized, many farmers might concentrate less on mysterious activities concerned with meaningless records, and instead direct their energies towards what is really required—ever more skilful day-to-day management.

Choice—the East Friesland

The second limitation is, of course, the genetic potential of the breed. The best of the Crickley Barrow Cluns were averaging around 170 per

cent lambing index, but more than this was required for the Colbred. Was there a breed capable of giving this Colbred programme a real shot in the arm for prolificacy and milk? Certainly there was no British sheep good enough for the purpose, but one or two Continental breeds suggested themselves.

The choice fell eventually between the Finnish Landrace and the East Friesland. Both had exceptional prolificacy and a lot of milk; the Finnish in fact has strains capable of achieving 400 per cent quite consistently. But for a number of reasons, and partly because of procurement problems, the East Friesland was selected. It is a peculiar animal to look at: its thin red lips, mean expression and long, thin tail suggest almost a parody of a sheep. But it produces triplets more often than not and has the ability to provide three times as much milk as any British ewe: it was indeed one of the old Dutch breeds, hand milked for cheese-making.

The Ministry of Agriculture sanctioned a small importation of these sheep from Holland in 1957—eight ewes and two rams—and these came out of quarantine just in time to settle down in their Cotswold surroundings in preparation for the start of the crossing programme that autumn.

The initial part of the work involved a total of 80 ewes and 10 rams of the four breeds. Once the four-way cross stage was reached, little culling on type was carried out. And yet by 1964 a quite remarkably uniform flock of 500 Colbred ewes was in existence. Prolificacy seemed to have stabilized around the target of 200 per cent and milking capacity as measured by lamb growth was distinctly better than that of comparable breeds of sheep.

It looked as if all the virtues of the four original breeds were retained in these new Colbreds without any of the more obvious disadvantages—for example, the dropped udder of the East Friesland. The sheep were pleasing to the eye; they were strong, active animals with plenty of scale, and the growth rate of the lambs was striking. On other important counts too—carcass quality particularly—the Colbred was living up to the targets which had been outlined at the start of the venture. The time had now arrived to test its ability as a crossing sire on a variety of hill breeds.

Chance meeting

Two small sales of ewes and rams were made at prices which were records for this country, but the second chapter really began late in 1962 with a chance meeting. Oddly enough, it was in one of those stately symbols of Victorian piety and good living—a Spa hotel. The National Agricultural Advisory Service had staged a conference in Harrogate to bring breeders, scientists and advisers together to discuss animal breeding. Cyril Thornber, the head of Thornber Bros., was giving a paper; Oscar Colburn was presenting the report of the sheep panel.

Both men had a lot in common. Thornbers had recently explored a fresh field, and were already running a performance and progeny test of Suffolk rams up and down the country. To pool resources seemed a natural step, and later the following year a new company, Thornber-Colburn, was formed to exploit both the Colbred and to administer the Down ram testing programme.

Here clearly were the beginnings of some striking possibilities, for the new company had immense capital resources, as well as the breeding, testing and selling expertise of a concern which sold 25 million day-old

chicks last year. Moreover the two main partners in the enterprise had exceptional flair for doing the right thing at the right time. Although it is agreeable perhaps to regard them as latter-day Robert Bakewells, those who know both suggest that it is sheer business acumen which distinguishes them; called to a different sphere, either might now be amassing a property empire or cornering the market in footwear.

The new Company's plans are to market half-bred, fat lamb mothers sired by Colbreds and to sell at the same time tested Down rams to mate with them.

The performance of the Colbred is currently being compared with pure Border Leicesters and Teeswaters on Blackface, Cheviot, Swaledale, Rough Fell, Clun and Welsh mountain ewes; last year some 80 Colbred rams were hired out on co-operating farms with an undertaking by the Company to buy back all the cross-bred ewe lambs. By this time next year there will be about 15,000 Thornber-Colburn half-bred ewes and ewe lambs ready for fat lamb production. In ten years time, if all goes well, the number sold annually could reach a very high figure indeed.

OSCAR COLBURN

Two men who met by chance in 1962 and joined forces to produce and develop the Colbred Sheep

CYRIL THORNBER

Sheep of the future

It is perhaps early days yet to judge the Colbred, an animal which came off the drawing board only eight years ago. But whether, according to one's degree of scientific detachment, it is regarded as a new breed, a hybrid or a mongrel, the odds are heavily in its favour. It has burst into the most primitive of our livestock industries, backed by all the geneticists, computers and know-how it needs to stamp its character indelibly on a wide section of the national sheep flock.

But the real significance of the Colbred story lies far deeper than the Colbred sheep itself. For this is a break-through into an entirely new concept of sheep breeding. and in the natural course of events the Colbred will be accompanied or replaced eventually by something even more productive. Already licences have been granted to the firm to import Finnish Landrace and Ile de France sheep. Perhaps looking a long way ahead we shall see this firm marketing an animal of the most varied ancestry, but one which will be capable of producing a litter of four lambs twice a year, of a known growth rate and carcass quality.

All the evidence is building up to suggest that in a comparatively short time fat lamb producers will be ordering by telephone half-bred ewes and the rams to go with them, not by breed but by numbers—numbers which will relate to the kind of performance specification which now backs our hybrid egg layers.

Derek Barber, M.R.A.C., joined the National Agricultural Advisory Service on its inception in 1946 and was stationed in Gloucestershire, where he has remained ever since. He is now County Advisory Officer. His co-author, **William Young, B.Sc. (Agric.),** is also in the N.A.A.S. in Gloucester and has been County Livestock Husbandry Officer since 1957. He was previously in Oxfordshire and, before that, in East Yorkshire, where he served with the W.A.E.C. until he entered the N.A.A.S. in 1949.

Losses of lambs from swayback can be very high, especially in 'swayback years'. The answer lies in COPPER

SWAYBACK

can be prevented

F. G. Clegg

SWAYBACK, swingback or warfa is a condition affecting young or newly-born lambs. It causes a typical swaying gait of the hindquarters, although more severely affected lambs may be completely incapacitated and never rise after birth. A delayed form of the disease may occur in lambs several weeks old, although they may have appeared normal at birth and may have grown well. The delayed form of the disease is seen in flocks where many new-born lambs have been affected with swayback.

The disease has been known in North Derbyshire for a long time as 'warfa' and up to twenty or thirty years ago swayback was a problem peculiar to flocks in certain localities such as this, where it would occur year after year, the severity of the losses varying greatly each spring. In recent years losses

have been serious in individual flocks much more widely throughout the whole country, and in 1964 the disease was diagnosed in Cornwall, where previously it was unknown. Unless measures are taken to prevent the condition, losses may be high—perhaps as many as one-half of all lambs will be affected. Badly affected lambs die soon after birth, but lambs with only slight incoordination of movement may grow and thrive. There is no worthwhile treatment of lambs which are affected at birth as the damage to the brain is so extensive. All breeds of sheep may be affected, and ewes of any age may give birth to swayback lambs.

The nervous system

The striking post-mortem feature which first attracted attention in the examination of swayback lambs was the cavity formation in the white matter of the brain. A diseased brain may exist only as a thin shell of nervous tissue surrounding large cavities of fluid. The recognition of this gross brain damage resulted in a neglect of the changes occurring elsewhere, for it is now realized that the spinal cord may be the only site of disease in lambs affected with swayback, especially in the delayed form which develops between a few weeks of age and three months.

The delayed disease may come on so rapidly that lambs may easily drown after losing their balance and rolling down banks into streams. Often one of a pair of twin lambs may show swayback at birth and the survivor may become affected with delayed swayback several weeks later, which suggests that the process continues after birth. The disease in the spinal cord is found only by the examination of sections under the microscope; there is no alteration apparent to the naked eye.

The same changes have been found to affect the spinal cords of lambs in certain parts of Australia, in New Zealand and South Africa. There have been descriptions of a similar disease affecting other species of animal such as goats, llamas and alpacas in South America, certain species of African game and, in this country, there has been a description of a spinal disease of red deer. The deer are affected similarly and become progressively more unsteady on their hindquarters until they sink on to their haunches after any movement.

Why swayback happens

Copper is an essential element for the functioning of some enzyme systems and the formation of the blood pigment haemoglobin. Lambs affected with swayback and their mothers invariably show low levels of copper in their tissues. It is possible, however, for some ewes with these low levels to produce normal lambs. A representative number of blood samples may be taken from a flock and the level of copper ascertained. Testing a single sample is of very little value on its own. Several samples must be collected to reflect the true position in the flock as a whole. In Australia the condition affecting lambs is known to occur on pastures with very low copper values; according to some recent work this may also happen in Britain, but in some cases other chemical factors in the diet result in a conditioned copper deficiency.

It has been shown, for instance, that when the molybdenum content of a ration is high, increasing the sulphate intake will result in a fall in the tissue copper levels of the animal and symptoms of copper deficiency become apparent.

The contrast between the brain of a new-born lamb affected with swayback (left) and that of a normal lamb (right) is clearly shown here. The affected brain consisted only of a thin shell of nervous tissue surrounding large cavities of fluid, which collapsed when the brain was examined

Experimentally a high incidence of the delayed form of swayback has been produced by adding molybdenum and a sulphate radicle to the diet of pregnant ewes which already had low copper levels in their tissues. This work is being continued and a study is also being made of the changes in the brain and spinal cord of the lamb which occur before birth.

Some years prove to be 'swayback years', when many flocks are affected with a high incidence of the condition, and there also appears to be an association with improvement of marginal grassland and the more abundant growth of pasture following liming or reseeding. An open winter also means that the ewes eat more grass and receive less concentrate feeding. It may be for these reasons that serious losses occur in the springs following exceptionally mild winters.

Copper—with care

Swayback may be prevented by treating the pregnant ewe with a carefully estimated dose of copper. An excess of copper will poison sheep very easily, so the greatest care must be taken first to ascertain that the flock really is in need of treatment, and then secondly to ensure that too much is not given either as a single dose or as the result of the accumulation of copper from different sources. For instance, it could prove dangerous to treat sheep with copper and for these same animals to continue to receive a copper-containing mineral supplement and then perhaps a worm medicine containing more copper!

Sheep will even accumulate dangerous amounts of copper in their livers if they are stall fed for five to six months on diets which contain very little of the element. This could occur when sheep are fed on ewe and lamb nuts which contain quite low levels. The addition of a copper-containing mineral supplement is unwise under these circumstances.

Field trials carried out in North Derbyshire some years ago showed the value of the injection of certain copper compounds. The dose of copper is given at mid-term of pregnancy and only one handling is required. When ewes are dosed by mouth with copper sulphate there is always the risk that a ewe may sometimes be missed. The frequency of dosing by mouth has varied, and on some farms it was necessary to gather and dose fortnightly during pregnancy. Mineral supplements and licks have the disadvantage that the exact amount of copper consumed is not known.

Treatment of pastures with copper sulphate has been carried out in Australia, but in Britain this may not be a good practice, for the salt is soon leached out and there is a chance of polluting streams. Again the risk of poisoning sheep with initial high levels of copper is real. On the other hand, the injection of a copper compound can be definitely timed and a very high level of protection against swayback can be expected.

Steps to be taken

A definite diagnosis must be made in every outbreak, since there are other conditions which may be confused with swayback. This is especially the case when swayback is suspected in areas where the condition has been previously unknown. Laboratory aid may be required to distinguish between swayback and the other diseases of the nervous system. Once a diagnosis has been made it is wise to consider the preventive measures to be taken in the future. During early pregnancy the following year, advice should be sought from a veterinary surgeon on the advisability of copper treatment of the ewes. This will take into account the type of feeding and may mean blood sampling of several ewes. If an injection of a copper compound is made on the advice of a veterinary surgeon, no further copper must be given and the indiscriminate use of copperized foods and medicines should always be avoided. Advice should be sought on the copper status of the flock. These precautions will avoid the danger of copper poisoning.

Nowadays swayback is not confined to certain isolated hills, and widespread occurrence may follow a mild winter when sheep are kept on improved grassland. A great deal has been learned about the nature of the condition, but much work remains to be done before it is fully understood. All the same, a convenient method of prevention is to hand, provided safeguards are taken.

The author of this article, **F. G. Clegg, M.Sc., M.R.C.V.S.,** is Assistant Veterinary Investigation Officer at the Ministry's Veterinary Investigation Centre, Sutton Bonington, Loughborough, Leics.

Which barley next?

December, 1964 issue — pp. 548-50

Readers will be interested to know that the variety of barley referred to in this article as H.B. 246/5/5 has since been named Maris Concord.

FARM BUSINESS

Sizing it up

John Jenkins, *who says that the enterprise must be big enough to ensure that the machine is fully used*

Mechanizing to reduce unit costs

To start with a word or two on pretty basic stuff, the whole subject turns on the question of return on capital. A machine depreciates at, say, 15 per cent of its value a year. It costs another 5 per cent interest on the capital employed, making a total of about 20 per cent. So that in theory, as a rough guide, a machine ought to show a return of 25 per cent a year on its capital value before it is purchased.

Of course, on the smaller farms this 25 per cent may be reflected in the freeing of labour to do other productive work, rather than in direct saving of costs. But that other productive work must be there or be found if the purchase of the machine is to be justified.

There is often talk of over-capitalization on our farms through the buying of too much machinery. Where this has taken place in the past it has usually been because a farmer has bought too many machines to mechanize too many different crops. Today, for some reason or other, there seems to be a tendency to insist on finishing an operation in what I regard as a ridiculously short time. This policy can just as readily lead to over-capitalization. For

example, many farmers nowadays insist on finishing their grain harvest in ten working days. This is carrying mechanization to ridiculous lengths. I know of one Massey 500 combine on a farm with 160 acres of grain. Operations need to be done timeously, but one should not spend money on machines just in order to do the job in half the available time.

Another thing, if machinery is to reduce unit cost, it must be bought to be used and not looked at. In many cases this calls for far greater specialization than we have at present on many farms and a reorganization and proper planning of farm systems. It is not my remit to go into this here, but it is an essential corollary to any article on mechanization.

Unit costs cut if . . .

But now let us turn to the main argument. A machine reduces unit cost because it makes it possible to achieve far greater output per pound expended in labour. The higher the cost of labour per hour, the larger, more expensive and more elaborate a machine can be justified. And today the cost of labour does warrant the use of expensive machinery, provided it is used to the full.

Broadly speaking, therefore, the bigger the machine, the more a man will do per hour and per year, if the machine is fully employed. Provided, therefore, that 25 per cent of the increased cost of the bigger machine is not greater than the cost of the labour saved, the bigger machine fully used will reduce unit cost.

In nearly every case, working on this formula, the bigger machine does help to cut down unit cost. The rather curious thing is that the most important exception to this rule that I have come across is in the field of the larger tractors, both tracklaying and wheeled. Perhaps though it isn't so curious, because we have such very good medium-powered tractors, and one or two very good medium-powered crawlers now too.

I have personally been very interested in the development of the larger wheeled tractors and I am absolutely confident that they have a real future. But I must say that at the moment, when a machine of under twice the horsepower is over three times the cost, the equation doesn't work out all that satisfactorily. (Incidentally, absolutely the converse seems to be the case with combined harvesters.)

If in the future we are going to spend more and more money on bigger and bigger machines—as we are—the farms of tomorrow will have to be organized much more on factory lines in so far as shift working is concerned. It is, for instance, quite easy to spend £4,000 on a ploughing outfit; it must be more sensible to work a double shift and work this one unit for twenty-four hours, than to buy another £4,000 unit and work them for twelve hours apiece.

To sum up so far then, it's quite simple. A machine must be fully used or nearly so, to reduce unit cost; and this means an enterprise that's big enough to do just that. Greater specialization, greater co-operation or a larger farm, or all three, are the only ways you can get to this point if you aren't there already. Beyond that, the bigger the machine the more it will reduce the unit cost, so once you've got to the first stage you just have to double up the specialization and the farm size once more. And so it goes on.

Sizes of different enterprises

This being so, and having regard to the remarks on productivity I made before, it might be useful to look at the optimum for one or two farm

enterprises. I am not suggesting that farm sizes should or need all be at the optimum or above, but it is useful to have a shot at suggesting the optimum for the various sorts of enterprise, partly for the sake of getting some sort of target and partly for seeing how big the problem is for many smaller farmers and how they can be helped to overcome their disadvantages.

For cereals, the optimum would seem to be determined by the size of combine harvester available. At the moment the maximum number of acres on this basis for one combine is of the order of 400–500 acres. My guess is that this maximum will rise to at least 600 acres within the next five years. There would also seem to be some real advantages in having an acreage large enough to justify two combines, as one can set up an organization to service two combines almost as cheaply and easily as one. This would make the optimum acreage for cereals in the region of 1,200 acres, with anything from 600 acres upwards a very good second best. Even this figure could be reduced with co-operation.

Dairying clearly needs a much smaller acreage, dependent primarily on how many cows can be milked and looked after efficiently by one man. There is the question of relief milking to be taken into consideration and the problem of first-class grassland management. But here it would seem that the family farm of 50–100 cows, and 80–200 acres, is about the right sort of figure.

I have had a shot at estimating what optimum acreages might be, but of course there is scope for considerable variation on either side. I suggest, however, that the smaller farmer must be very much more ready to co-operate with his neighbours if he is to get the use of good modern machinery without hopelessly burdening himself through over-capitalization.

Machinery syndicates have now fully proved themselves in practice. Yet very few farmers—and in particular very few small farmers—have made much use of them. For example, if for the sake of argument a 600-acre holding is the minimum optimum for cereal growing, it might well be possible for three farms with 200 acres each to combine and form a machinery syndicate and produce this minimum optimum acreage out of their three farms, so keeping their capital expenditure on machinery in line with that on a larger farm. Of course there are problems in this sort of co-operation, but Hampshire has shown that they can be overcome with goodwill and understanding.

Take my case

If I may finish with one personal example, on one of our farms we have recently put in hand the reorganization of the drilling operation as follows: previously, there were two crawler tractors working down land, two ordinary medium-sized tractors drilling, and one other medium-sized tractor for hauling out seeds and fertilizers: total minimum manpower, five men: total capital requirement on machinery, approximately £6,650.

We have now replaced this set-up with one large wheeled tractor pulling down land, one large wheeled tractor with one very large drill and one medium-powered tractor for hauling out seed and fertilizers: total minimum manpower requirement, three men: total capital requirement on machinery, approximately £6,900. For an additional capital expenditure of approximately £300 we have achieved the saving of two men, and as this is the time of the year of peak labour requirements, one might well argue that this

increase in capital expenditure of £300 has saved at least £700 a year, or possibly even £1,400.

This of course is a supreme example of how spending capital on the right machinery does work. It is equally possible to think of many instances where capital has been spent on machinery and achieved no worthwhile reduction in labour costs, or increase in output. The point of this article is to try to emphasize that this sort of sum must be done *before* money is spent on machinery and not afterwards.

John G. Jenkins farms 1,000 acres in Cambridgeshire and 1,500 acres in Lincolnshire—all arable. He concentrates mainly on cereals, but he also grows potatoes and sugar beet and has a medium-sized turkey unit. Mr. Jenkins is a member of the Agricultural Advisory Council for England and Wales and of AMDEC, and is a Past President of the Scottish N.F.U.

Tomatoes under Reflectors

A note from Fairfield E.H.S.

FAIRFIELD Experimental Horticulture Station has been experimenting with aluminium foil and silvered plastic reflectors in E–W tomato propagation houses to increase natural illumination. The results have been variable.

In the first two trials (winters of 1958–59 and 1960–61) plants under aluminium foil reflectors were more advanced than those on open benches. Plants taken on to cropping gave an increased early yield.

In 1961–62 a similar trial used silvered plastic film. The reflection of visible light of this material is equal to that of aluminium foil, but reflection of infra-red could be much less. No growth increase was noticed; neither was there any difference in cropping. Again, in 1962–63 the same silvered film was used and no differences in early yield were detectable. This technique was again tested in the early spring of 1964 using an aluminium foil, but without noticeable response from the plants.

In only two years out of the five, therefore, was an effect noticed on the plants, and in one year a yield difference in the growing houses. These results might be due to chance or to the fact that different reflective materials were used. Possibly weather conditions or other factors at present unknown had an effect.

On Lt. Col. HARDING ROLLS'S Monmouthshire farm

Triple Suckling Pays

(with Welsh Blacks as nurses)

T. J. Price

Welsh Black nurse cows at Hendre, each suckling three calves

AT the Hendre Home Farm of Lt. Col. J. C. Harding Rolls, M.C., Monmouth, calves are being reared by triple suckling. The farm covers some 600 acres and it is devoted to a mixed system of corn, dairying, fat lamb and beef store production. Until 1962 the dairy herd was entirely Welsh Black, but these have been replaced by Friesians and the Welsh Black cows transferred to the rearing of calves. Most of the cows used for rearing are autumn or winter calvers and have lactation yields around 700 gallons.

The Hendre system

The calf is removed from the cow either immediately after birth and bucket fed or after three days when three other calves (either purchased or born on the farm) are put on to the cow. If no other cow is due to calve at this time, her own calf is removed at birth and reintroduced after 3–4 days with two other calves. This procedure seems to overcome the cow's non-acceptance of calves other than her own. The cow and calves are usually kept in a loose box during this time and as soon as the cow has accepted the three calves, they are turned out either into yards or sheltered fields, depending on the weather conditions at the time.

Before calving the cows are outwintered on hay and are fed concentrates up to a maximum of 6 lb of cereal just prior to calving. This is continued until there is sufficient grass to maintain the milk yield. A creep feed of a cereal/low-protein concentrate is provided for the calves during the winter and also at grass in late summer if the quantity and quality of grass is such that growth and development might otherwise be retarded.

The calves are weaned in the autumn and are either sold then as stores or outwintered and sold as stores in the spring, depending on their age and condition and ruling market prices.

Quick finish

Under this system of triple suckling the calves reach a weight of 5–5½ cwt at 10–12 months and are generally in forward condition. The demand for such animals which will finish quickly and economically at 14–18 months under intensive or semi-intensive systems, either in yards or at grass, is rapidly increasing. In the past this type of store has been mainly the product of the single-suckled herds. But many farmers are now finding they can produce an animal of nearly equal quality by other rearing methods and which, in some ways, might be preferred by the fattener to the single-suckled weaned calf. From the rearers' point of view the profitability of single suckling depends on the Hill Cow Subsidy, so this system is restricted to the more upland farms. Other farms on the semi-uplands or lowlands, particularly those under 150 acres, have to resort to other systems of rearing in order to show a satisfactory income. The systems of multiple suckling, bucket rearing and early weaning are well known and these can, with good management, produce the store required. It is not, however, only the traditional store raiser who is attracted by triple suckling—it is also an alternative to dairying.

Better than single suckling

These are records taken from farms in Monmouthshire, showing the comparative margins for different systems of rearing:

System	Total variable costs per calf	Gross Margins per animal	Gross Margins per year	Gross Margins per acre	Period of rearing
	£	£	£	£ *s.*	months
Early weaning	32	28	28	45 0	10–12
Multiple suckling	32	28	28	40 0	10–12
Triple suckling	23	27	27	32 0	9
Single suckling	26	25	25	12 10	9
* including Hill Cow Subsidy	26	36*	36*	18 0	9
Dairying—semi-upland	—	—	—	31 0	—

Gross Margin

The Gross Margin is the difference between gross output and variable costs; gross output includes the value of the calf subsidy, and from it has been deducted the cost of purchased calves at £15 per head. The variable costs are (a) concentrates, (b) grazing and hay, (c) share of losses and (d) vet. and medicines. The fixed costs (labour, machinery, rent and miscellaneous) are not included; these will vary from £10–20 per acre depending on the type and size of the holding.

This table shows that triple suckling is much more profitable than single suckling. It also compares favourably with milk production on semi-upland farms and is an alternative on those dairy farms producing milk under conditions of inadequate buildings and labour. But the system needs four things (1) cows calving during December–January, (2) cows with sufficient yield to rear three calves, (3) an organized supply of calves and (4) good grassland production and management to maintain milk supply and growth of calf and so keep concentrate feeding for both cow and calf during the grazing period to the minimum.

T. J. Price, N.D.A., who is County Livestock Husbandry Adviser for Monmouth, joined the N.A.A.S. in 1957 and was stationed in Devon, moving to Monmouth in 1963. He is a member of the Royal Agricultural College and is particularly interested in management and economic problems related to hill farming.

Weather, location, few buildings; these are three factors contributing to the difficulties of hill farming in the North of England

S. Robson
ECONOMIST AT THE
UNIVERSITY OF NEWCASTLE UPON TYNE

reviews the results of

Farming on the Northern Hills 1961-63

OF all the rough grazings in England and Wales, nearly one-quarter are situated in the four northern counties. It is also fact that of all the farming land in these four counties, a third is classified as rough grazings. With minor exceptions, all this land is used for hill sheep, plus some cattle.

In the North, as elsewhere, types of farming and systems of management vary quite widely: variation in systems of hill farming are less, but they also occur. Two main hill systems are readily identified. One of these includes cattle and sheep rearing, with dairying contributing a significant part of total production; the other is confined solely to rearing cattle and sheep.

The presence of dairying in the first system often originated in the struggle to survive during the 'thirties, and in some cases this part of the enterprise has been developed to the point where the whole farming system now revolves around it.

Where rearing only is undertaken, this can usually be attributed to such considerations as altitude, limited buildings, and in some instances to a small proportion of in-bye land, so making it impossible to provide pasture and conserve grass for both sheep and the dairy herd.

Weather is perhaps the strongest limiting factor on hill land. The year 1956–57 was the most favourable for northern hill farms recently. Since then, apart from the drought of 1959, conditions have tended to be cool and wet and therefore not conducive to successful lamb production. All stockmen will remember the bad conditions of the winter of 1962–63.

At a disadvantage

Hill farmers will have had greater difficulties to contend with than lowland farmers in maintaining profits in recent years. Lowland farms have the obvious advantage of being able to make some adjustment to their organization and production to keep pace with the changing patterns of demand and supply; on the hills the pattern of production is virtually prescribed. Moreover—cattle and sheep are of necessity offered for sale at one particular period of the year, governed by calving and lambing dates to fit in with environmental conditions. This is not to say, however, that there may be no advantage to be gained from the possibility of earlier calving or lambing dates in an effort to avoid marketing at times of glut.

As long ago as 1941, a speaker at a Hill Farming Conference stated: 'The present financial position of hill farming compares unfavourably with the position of nearly all other kinds of farming'. As far as the last three years are concerned, this statement still stands, as is shown by the figures below. These give the average profit per farm from 1960–61 to 1962–63 for selected types of farming in the North of England. Although the hill farm groups nos. 7 and 8 appear to compare quite well with lowland dairy farms, it must be noted that these are more specialized than the general run of hill farms. Group 7 breeds cross mule lambs and Group 8 consists of only four rather large-scale hill sheep farms, probably with better than average management.

TABLE 1

Average profit per farm over three years 1960–61 to 1962–63

Group	£	*Group*	£
1 Lowland dairy farms	1,442	5 Upland farms (with dairying)	988
2 Mixed farms	1,614	6 Upland rearing farms (fell rights in common)	934
3 Feeding and cropping farms	1,911	7 Upland rearing farms (fell grazings sole occupied)	1,368
4 Cropping and feeding farms	2,657	8 Upland rearing farms (fell grazing sole occupied)	1,530

Dairy stock carries sheep

The importance of dairying on some northern hill farms can be further demonstrated by the fact that in a sample of 26 Westmorland hill farms milk contributed about 44 per cent of gross output (on individual farms this contribution ranged from 30 per cent to 70 per cent). The more stable profits from milk, together with a significant increase in cattle output, no doubt helped to alleviate the fall in profits from hill sheep.

Some relevant financial features for these years are given in Table 2. Average profit per farm shows a continuous decline, which may be attributed to the following factors. Between 1961–62 and 1963–64 gross output per farm increased by less than 2 per cent. Output from cattle and milk

increased by 12 per cent and 5 per cent respectively, whilst sheep output declined by 12 per cent. On the input side, there was a 17 per cent increase in variable costs and an increase of 4 per cent in fixed costs. The final result was a decrease in profit per farm of 24 per cent, from £1,077 to £814.

The increase in variable costs can be attributed in the main to increased purchases of concentrates, which amounted to 64–66 per cent of variable costs each year, and to an increase in purchases of hay which amounted to 2 per cent of total variable costs of 1961–62 and 4 per cent for each of the following two years. Indeed, bought concentrates increased quite a bit over the three years, while hay purchases were more than doubled between 1961–62 and 1962–63 and increased again slightly between 1962–63 and 1963–64. It is not possible to allocate these foods separately to cattle and sheep but it can be assumed that no small part of the increase was due to the need to feed survival rations to sheep during severe weather.

There is also some indication that more hill farmers provide hand feeding for hill sheep during bad weather. It is difficult to imagine that the slight risk of interfering with the ranging qualities of the sheep could justify withholding feed and so risking death and loss of lambs and wool.

TABLE 2

Some relevant financial results for an identical sample of Westmorland upland farms

	1961–62	1962–63	1963–64
		per farm	
	£	£	£
Profit	1,077	942	814
Gross output	3,904	3,926	3,977
Variable costs	1,659	1,820	1,943
Fixed costs	1,168	1,164	1,220

In contrast to the farms on which dairying is important, on those where rearing only is undertaken sheep production is a major part of output. In the sample of twenty-three such farms sheep and wool contributed on average over 50 per cent to gross output, and in some individual cases this may rise to as much as 80 per cent or more. On the farms with dairying, however, the sheep contribution to output is only about 30 per cent.

Profits down by one-third

I have said that variation in management practices can be found within the general rearing system. The twenty-three farms concerned in Table 3 are divided into three groups. Those in Group A have rights of common grazing, both restricted and unrestricted, and their sheep are mainly pure bred. Group B farms have all their land, including the fell, in their sole occupation and pursue a policy of cross mule lamb production. Group C consists of farms again with all their land in sole occupation, but the sheep are mainly pure bred.

In this instance, perhaps more than that of the farms with dairying, the weather conditions must be taken into account. Profit per farm over the whole sample fell by 1963–64 to almost one-third of the 1961–62 level. Individual groups also showed a substantial average drop in profit between these years. Indeed in 1963–64 the farms in Group A averaged a loss. While on the farms with dairying gross output tended to remain constant, on farms without dairying it declined over the three years—mainly because of a

continuous fall in output from sheep and wool. Wool production also fell on every farm in each year. The number of lambs reared during the first two years was fairly similar, but there was a marked drop in 1963–64. On only two farms did the numbers reared remain constant. All other farms reared less lambs in 1963–64 than the previous year. On one farm only 30 lambs per 100 ewes were produced!

TABLE 3

Some relevant financial results (per farm) for an identical sample of Northern upland rearing farms

		Profit	Gross output	Variable costs
		£	£	£
Group A	1961–62	1,040	3,049	954
	1962–63	668	2,973	1,098
	1963–64	– 28	2,572	1,261
Group B	1961–62	1,644	3,973	1,027
	1962–63	1,386	3,996	1,197
	1963–64	750	3,519	1,354
Group C	1961–62	1,474	4,466	1,442
	1962–63	1,356	4,323	1,558
	1963–64	837	4,090	1,923

The rearing farms also showed a considerable increase in variable costs. Over all the farms, this averaged 14 per cent between 1961–62 and 1962–63 and a further 16 per cent between 1962–63 and 1963–64. Again this was in some measure due to additional purchases of concentrates and hay necessitated by hard winters.

Larger units?

Although hill farming in the North experienced difficult times during the three years under review, it would be unwise to attribute this entirely to poor climatic conditions. The extensive type of farming dictated by location, climate and quality of land necessarily calls for large farms in terms of acreage. The smaller acreage farms appear to face increasing difficulty in making reasonable profits. One solution to this problem may be the amalgamation of small holdings into larger units. This poses the difficult question of how Exchequer support can be given to overcome temporary adverse conditions without acting as a brake to amalgamation.

G. B. Taylor

Protection at the farm gate

points to some common-sense precautions which can save distress and heavy loss on livestock farms

Keeping disease off your farm

As soon as there is an outbreak of foot-and-mouth disease in the neighbourhood, most farmers take energetic measures to guard their stock by keeping vehicles and visitors away. Gates are locked, straw disinfectant mats are put down, vehicles are barred and nobody enters or leaves the farm. Obviously such strict security measures cannot be maintained at all times but a modified form of them as an everyday practice, plus the precautions discussed later, would go a long way towards keeping out disease. And this applies not only to the notifiable diseases like foot-and-mouth disease, swine fever and fowl pest, but countless others such as virus pneumonia, infectious bronchitis and calf scour, which, although not so spectacular, nevertheless cause severe economic loss.

In some outbreaks of disease the source of infection is obvious. For example, swine fever may develop within a few days amongst pigs from a market; poultry, which a dealer handled a few days previously, may show symptoms of fowl pest. But in a great many instances, particularly with the non-notifiable diseases, the source remains obscure; indeed it is rare for any effort to be made to discover one. Any farmer who cares to think back over the past few years and consider the various livestock troubles that he has had, will almost invariably be unable to pinpoint their origin. If only he knew the source, he might be able to prevent a similar occurrence.

Area of risk

Let us examine the means by which disease can be introduced among stock. In most of the diseases we are considering, the organisms—viruses or bacteria—which cause the disease multiply in the animal body and are constantly being excreted in huge numbers via the respiratory, digestive or urinary systems, and in some cases through the skin. Indeed, in certain diseases, the organisms leave the body through all these channels and can set up the disease in susceptible animals.

This means that there is a danger zone around an infected animal; yet an animal may be infected and pass on the infection before it shows symptoms of disease and before anyone has realized that it is ailing. The organisms, expecially when protected by a layer of dust or animal matter, can live for long periods on the ground where the animal has stood or on other things such as the clothes of an attendant which have been touched. The area of risk extends for some distance because many bacteria and viruses are air-borne and the particles are spread into feeding passages and into the surrounding area. Healthy animals in proximity to the ailing ones may carry these organisms mechanically on their hair or feet without being affected themselves at that particular time.

Farm gate security

Since obviously a farmer can have no control over what happens on other people's farms, his only remedy must lie in his own security arrangements—by trying to prevent the introduction of infection; in other words, the barrier should be at the farm gate—your farm gate!

It is possible that the very next person coming on to your farm has been in a danger zone, perhaps a disease is in a very early stage, and no one is aware of it. If the caller disinfects his boots at the farm gate he will shed some, but not all, of the disease germs. So what must be done? Obviously the less the visitor moves about the premises the less the danger. Ideally—and these arrangements are made at certain research institutes—an area of frequently-disinfected concrete on which to park his car, and a sack permanently soaked in disinfectant for him to walk over just by or outside the entrance, with a notice asking callers to wait there, should form part of the security arrangements. A caller shouldn't be allowed to wander around the farm; after all it is you he has come to see and he shouldn't go among the stock without your permission. It is important that, on returning from market, slaughterhouse, knackery or indeed from any place where there is a possibility that a disease could have been picked up, everyone should make sure, by washing hands and dipping boots in disinfectant, that infection is not taken to the stock.

You should be doubly careful regarding people who come amongst your stock and those who collect your animals. Remember where they could have been and take precautions accordingly.

Where does the lorry stand in your yard when it comes to pick up your stock for slaughter or marketing? What about the animals inside it? In a short time urine and droppings will fall on to the yard and these may well contain infective organisms. You and your staff may then carry the disease to your stock. If loading has to be done near buildings containing animals, make certain that it is on an impervious surface which can be disinfected as soon as the vehicle has left.

What about newly-bought stock? The twenty-eight day isolation rule should not only be thought of in connection with the notifiable diseases. Remember that your stock has learned to live with any special bacteria on your farm, but stock from other farms has not. Moreover, the animals you buy-in may also have their own particular kind of bacteria to which yours have not acquired tolerance.

Routine safeguards

So much for 'imported' disease. There are measures you can take at home as well. For example, how often do you disinfect your buildings? This, of course, is routine practice in broiler production, but regularly carried out it can save a lot of trouble, particularly in preventing build-up infection in animal matter in buildings used for other stock. And what are you doing to control vermin—another vehicle of disease?

What about those old tubes of antibiotics? When you put a tubeful into an infected udder do you immediately disinfect your hands or do you carry the infection to the next cow or even back to the box of tubes? And that old half-full medicine bottle? What was it used for? How many disease germs were left on it when you drenched that cow? Is that now nameless drug safe to keep—it is **not!**

If an animal dies on your farm—whether in a building or in a field—do you take care to prevent vermin or scavenging animals or birds from gaining access to it? Don't forget that these may pick up infection and transmit it to other animals. Do you ever think of disinfecting the place where the dead animal lay? Had it died from anthrax, this would have been done by the local authority but had it died, say, from blackleg and the carrion crows had been busy, think of all the bacteria that would have been spread over the ground waiting for the rest of your cattle to wander through.

More thought given to security is time well spent. Protected stock means less disease on your farm.

G. B. Taylor, M.R.C.V.S., is the Ministry's Divisional Veterinary Officer for Hertfordshire. He is also a barrister-at-law.

The right use of equipment in the poultry house is an essential part of good management.

A NAAS survey in the Eastern Region uncovers faults of interest to farmers and manufacturers alike

Poultry Feeders and Drinkers

report on FEEDERS

by **MARGARET MURRAY** and **N. R. C. CHAPLIN**

Of all essential equipment on any poultry farm, the food hopper or feeder and the drinking vessel or water trough have the dubious reputation of being subject to most abuse. It is argued that the reason for this treatment lies in the multiplicity of sizes and shapes thought necessary to supply birds from a few days old to maturity with food and water.

In an attempt to determine the usefulness and claims for the efficiency of any major design among the many varieties of these two poultry appliances, Poultry Advisers in the N.A.A.S. of the Eastern Region carried out a survey in 1963. The feeding and drinking equipment at over 100 farms was examined and the poultry farmer questioned on his experience relative to the efficiency and reliability of the installations under conditions on his farm.

Where do the weaknesses lie?

One of the most depressing conclusions from this survey was the apparent inability of many poultry keepers to familiarize themselves with mechanical equipment—an observation which can be applied with equal force to many suppliers of these appliances. In many cases the farmer just didn't know how fine adjustments could be made in the operation of drinkers and feeders; the retailer of the appliances had little or no knowledge of the suitability of the plant for a specific type of poultry unit while, at the other extreme, some farmers with a mechanical bent had made material improvements to their equipment.

Many have urged the desirability for a central testing centre for poultry farm appliances—on the lines of that run for agricultural machinery by the N.I.A.E. At such a centre equipment would be tested under practical conditions for at least twelve months and a full report made to the manufacturer at the end of the test, setting out the conditions under which it had been tested and the faults (if any) together with suggestions for improvements. The major difficulty in the way of such a test lies in the many differing strains of birds and the variety of housing types, but the findings of this survey certainly point to the value of such a testing project.

Failure or a weakness exhibited by a feeder or drinker cannot always be laid at the door of the manufacturer—or the farmer. Some varieties of birds have a built-in nuisance characteristic. This was found to be so on a number of farms when observing instances of food wastage or water spillage; for example, two different types of hybrid layers were being housed in one cage battery. One variety—a light hybrid—was guilty of very little water splashing, while the other, a heavier strain, was flicking water constantly, so running up labour costs resulting from the need to keep cleaning the floor and food troughs. In the case of both sets of birds the water depth was not over $\frac{1}{2}$ inch, mash was being fed and the birds had been debeaked. This would seem to be a behaviour characteristic, and one can only assume that some birds, like ourselves, have inconsiderate and annoying habits!

To some extent the problems of food waste and water spillage are being solved. Progress has been made with drinking equipment now that many cage battery manufacturers are able to supply nipple drinkers. This innovation marks the greatest advance in waste-proof and spill-proof drinkers.

In the survey it was thought desirable to consider the different types of feeders under several categories—Mechanical, Open Trough, Tubular, and Hen Battery.

Mechanical feeders

Six makes of mechanical feeders were surveyed, and criticisms were relatively few. But one common need was that the motors should be of the totally enclosed type to avoid breakdowns arising from dust getting in. Most would be improved by the incorporation of a sieve in the bulk hopper to eliminate not infrequent stoppages caused by string, labels and other 'foreign bodies'.

A general criticism was that insufficient advice is given to the user in the day-to-day operation and general maintenance of mechanical feeders. Some instances of food wastage were recorded, but insufficient in degree to allow the surveyors to be dogmatic over the cause. The anti-perch wires seem unnecessary and where used did not seem to be effective. Shaped continuous troughing or round pan, as opposed to the more conventional square section, appeared to be more efficient, but this opinion must be offered with some reserve in view of their recent appearance and the current lack of experience.

In feeders where food is returned to the bulk food hopper, cleaners should be incorporated as a standard fitting and not provided only as an optional addition.

Cleaning of mechanical feeders led to difficulty with some users. This would be overcome and dismantling and re-assembly made easier if the trough sections were numbered and the direction of chain travel indicated.

To prevent food wastage when using tubular feeders, the pan should be adjusted correctly and the trough must be sufficiently high from the floor

Finally, the production of mechanical feeders adjustable for stock ranging in age from one month to maturity would be a boon for those who practise all-in all-out systems.

Open troughs

The majority of the open troughs surveyed were made of wood. Wastage with these troughs can virtually be reduced to nil if they are not filled above two-thirds of their capacity. A guard or spinner is essential to prevent fouling by the stock.* In spite of these advantages, labour costs are leading to the replacement of this type of trough by either mechanical or tubular feeders on the larger farms.

Tubular feeders

The tubular type of feeder is becoming increasingly popular for all classes and ages of stock. This trend may well be the reason why an impressive multiplicity of designs is available to the poultry keeper. The survey indicated that few retailers can advise on the suitability of the many types of tubular feeder for mash, crumbs or pellets, or even on the capacity! It would be of great benefit if this information were stamped on the tube.

In many instances the design indicated failure to realize that feeders have to be both cleaned and stored. In this matter projecting rods are a great nuisance; nuts, bolts and washers are subject to rust and often twist off when adjustments are needed. The advantages of the polyethelene type of tube feeder are offset by failure to respond well to heat treatment when subject to cleaning, and spacer lugs (where present) break off as it eventually becomes brittle. It is hoped that some of these defects may be remedied with the newer types of heat-resisting polyethelene.

---

*The *Report on the Design and Construction of Poultry Feeding Troughs* by Willard Moore and published by Harper Adams Agricultural College is well worth reading.

The degree of food wastage with these feeders varied considerably, but could invariably be related to the height of the trough from the floor, size of bird and pan adjustment. Filling direct from bags and by scoop with little care was a further cause of waste. There is an obvious need here for a more efficient method of filling the tubes and one which is not so influenced by carelessness on the part of the operator. A mechanical method recently introduced from the U.S.A. may solve this problem.

The major criticism was the great variety of size without any apparent advantages. Fewer, standardized designs would be to the obvious advantage of the user.

Hen battery troughs

Of the ten different makes surveyed, little comment was offered on construction design, except the need for seamless troughs to avoid crevices in which stale food could lodge or become a home for red mite. Most troughs were filled mechanically or semi-mechanically, and no difficulty seemed to be experienced in filling where the drinker was not mounted too closely to the feeding trough. Some degree of wastage could be avoided by ensuring that the travelling hopper is correctly adjusted and care observed in maintaining that adjustment and keeping the depth of food in the trough at the appropriate minimum.

Other cases of waste did occur, for which the reasons offered were type of bird, number of birds per cage, type of food, debeaking effects and some relationship with light intensity. Unfortunately, the evidence available did not permit any firm conclusions over a precise relationship—if any. With the rise of batteries in popularity, this aspect would seem to be a promising field for an investigation leading to valuable conclusions, but the scale of such an inquiry to include all the factors makes it an unlikely event.

One practical approach to food wastage where the cause cannot be precisely determined is to feed twice a day, keeping the food depth at a minimum.

The continuation of this article, next month, will deal with drinking equipment.

Margaret Murray is a Poultry Advisory Officer in the Eastern Region of the N.A.A.S. and is stationed at Bury St. Edmunds. She holds both a National and Scottish Diploma in Poultry and, before joining the N.A.A.S. in 1960, was a lecturer in Poultry Husbandry at Radbrook College, Shrewsbury, from 1955 to 1958.

Her co-author, **N. R. C. Chaplin, N.D.P., C.D.P.,** is also a Poultry Advisory Officer, stationed in the Holland area of Lincolnshire, where he has been since 1938. He was formerly assistant on a poultry farm at Cobham, Kent, and Assistant Instructor in poultry keeping at the Farm Institute, Sparsholt, Hampshire.

'In most activities it is a condition precedent to success that the objectives should be recognized at the outset: the maintenance of records and the preparation of accounts are no exceptions'

says

G. H. Camamile

Concerning Annual Accounts

THE annual accounts which are prepared for most horticultural growers are much the same as those for other small businesses. Most of them are prepared for the same reasons too—the need to submit accounts to the Inland Revenue and perhaps also to the bank or other source of finance. A proprietor may use the accounts himself to measure his success, but it is probably fair to say that in most small enterprises the interest in this 'paper prosperity' lacks depth and is of short duration.

For horticultural growers, however, such accounts can be used by the advisory service as a basis for the economic analysis of holdings to measure, and perhaps find a basis for improving efficiency. Whilst the suitability of annual accounts of any kind for this purpose is limited, they are even more difficult to use if they have been prepared in the first place for the rather narrow requirements of taxation and finance. So if a grower intends to have his accounts used to help assess his skill in managing resources, he might just as well recognize it at the outset and have the work of preparation directed to this end.

The usual set of annual accounts consists of a Revenue Account and a Balance Sheet. The Revenue Account goes under various names, but Trading Account, Trading and Profit and Loss Account, Profit and Loss Account, are the most familiar. The most appropriate description is 'Revenue Account', because it best describes an account whose purpose is to explain the reasons for the net inflow or outflow of money or money's worth as a result of carrying on the business during the period for which the account is prepared. To be consistent, however, with the terminology used by the N.A.A.S., the name Trading Account is used from now on in this article.

The Balance Sheet

As its name indicates, the Balance Sheet is a list of balances at a particular date. It sets out the assets and liabilities of the business at the end of the year for which the Trading Account was prepared, showing how the proprietor's investment of capital was deployed and how the rest of the money used in the business was provided. As a rule the figures in a Balance Sheet show the current values of only the liabilities (loans, creditors, bank overdrafts, etc.), debtors (money owing to the business) and cash. The stocks and valuation are usually included at cost or estimated cost of production; the vehicles, machinery, equipment and building expenditure are shown at figures which are calculated by deducting from the original cost of each item the depreciation or devaluation written off in the trading accounts of successive years since the time of purchase. Freehold land is usually shown at its original cost price. The amounts shown for such assets, therefore, represent not their present realizable value but the unexpired or unexhausted proportion of the original expenditure.

According to these rules, which are the same as those used by the Inland Revenue's Inspectors of Taxes when they follow the growth of assets, the Balance Sheet shows the net worth of the business in terms of unused input at the year end date. One way, therefore, of finding out whether a business has made a profit in any year, would be to draw up a Balance Sheet at the end and compare it, taking into account personal spending and any expenditure on new buildings or equipment, with a similarly constructed Balance Sheet, or statement of worth, at the beginning of the year.

Take a simple example. If a man's capital in a business (the net worth shown by the Balance Sheet) at the end of a year is, say, £472 more than it was at the beginning of that year, and he has paid out in personal expenses a total of £749, then his profit for the year has been £1,221. For tax purposes there might be adjustments to make but in broad outline this is how the net profit from a business can be found by preparing—and comparing—statements of the capital position at year ends only. For many very small businesses in fact the Inland Revenue is content that the figures on which the Income Tax assessments or reliefs are based should be determined by this method.

The Trading Account

The function of the Trading Account, after personal expenses and expenditure on new buildings or equipment have been identified, is to explain in detail the difference between the state of affairs at the beginning and that at the end of the year. The form which that explanation takes depends on the purpose for which it is prepared. If a grower wishes to have his annual accounts prepared in a way which will provide as much as possible of the information needed to measure his efficiency, his accountant's analytical work, from which the items shown in the Trading Account are made up, has to be directed right from the beginning towards providing it.

The grower must help, of course, by letting his accountant have, at the very least, cheque book and bank paying-in book counterfoils which adequately describe the bank transactions, reliable lists of all cash receipts and payments, and all invoices, statements and advice notes. But, above all, both grower and adviser must realize that the accountant has to know or decide, before he starts his work at all, what information is to be shown

on the final accounts. Unless some guidance is given, for example, by an analysis already kept by the grower, it is likely that the accountant's analysis will provide the type of information known to be required, as a rule, by the Inland Revenue's Inspectors of Taxes. If, therefore, the grower and his adviser can indicate in advance what analysis they require, there is a much better chance that the final annual accounts will be positively helpful in an economic analysis of the farm and in planning for the future. It will be readily acknowledged that in this respect the requirements of the Inland Revenue are of secondary importance—as a rule their demands are not unreasonable and once they appreciate that there are genuinely reliable records, most Inspectors of Taxes are unlikely to worry about trivialities of analysis.

Grower can help accountant

Perhaps the simplest way of letting the accountant know the kind of information that is needed is for the adviser to give to the grower, in good time, a copy of the N.A.A.S. form of Horticultural Trading Account (M.A.1(H)) to be passed on to the accountant with the books and papers. The grower can then ask his accountant to prepare the annual accounts to show so far as is practicable in all the circumstances the main items of information required by this form of presentation of the Trading Account. The accountant will not be able to fulfil all its requirements, but if he knows in advance, in this way, what is needed, the accounts he prepares will go a long way towards helping in the completion of the form itself and in the adviser's preliminary examination. It may take a year before the classification of creditors and debtors can be brought into line with these requirements, but this is only an initial difficulty far outweighed by the advantages of a regular check on management efficiency for the future.

There is a further way in which the grower himself can assist in this process and, maybe, limit any additional cost which might be involved in asking his accountant to provide a more detailed analysis of income and expenditure. He can record his own cash and bank transactions in the record or analysis book recommended by the N.A.A.S. and designed with the specific objective of facilitating completion of the Trading Account form M.A.1(H). If this is kept carefully and accurately, it will not only help the adviser to identify any specific items of information he needs, it can also relieve the accountant of most of his problems in the analysis.

In brief

If these conclusions will bear repetition they may be summarized in three short paragraphs.

If he hopes to make any serious use of his accounts for management purposes, the grower must, at the very least, describe all transactions on his cheque book and paying-in book counterfoils, retain all invoices, statements and advice notes, and keep adequate notes of cash payments and receipts. These are the elementary requirements to put the accountant in a position to carry out the wishes of his client and the adviser and to avoid wasting his and their time.

The grower should let his accountant know, before the annual accounts are prepared, just what information his adviser would like to have provided in the Trading Account. The simple way to do this is to let him have sight of

the Trading Account form M.A.1(H) before he starts work on the grower's accounts. The accountant can then do as much as is reasonably possible, having regard to the state of the records, to show appropriate figures in the accounts.

By keeping accurate records himself of cash and bank transactions in the record book designed specifically to provide information for completion of the Trading Account form M.A.1(H), the grower can make both the preparation of his annual accounts and their subsequent analysis easier and more rewarding.

Mr. G. H. Camamile is joint author, with Donald Theophilus, of the recently published book, *Records for Profitable Farming*, published by Hutchinson, price 21*s*.

The Ministry's Publications

Since the list published in the December, 1964, issue of *Agriculture* (p. 574) the following publications have been issued.

BULLETINS

No. 54. The Rearing of Chickens (Revised) 5*s*. 6*d*. (by post 6*s*.)

An illustrated guide for the poultry keeper who is seeking up-to-date information about natural and artificial methods of brooding and rearing. Modern large-scale and intensive systems are dealt with and equipment is fully discussed.

OTHER MAJOR PUBLICATIONS

Domestic Food Consumption and Expenditure: 1962 (Annual Report of the National Food Survey Committee) 10*s*. 6*d*. (by post 11*s*.1*d*.)

Animal Disease Surveys: Report No. 3. (New) 8*s*. 6*d*. (by post 8*s*.11*d*.) (see page 42.)

Animal Disease Surveys: Report No. 4. Brucellosis in the British Dairy Herd (New) 5*s*. 6*d*. (by post 5*s*. 11*d*.)

ADVISORY LEAFLETS

No. 61. Pea, Bean and Clover Weevils (Revised)
No. 106. Apple Aphids (Revised)
No. 299. Brussels Sprouts (Revised)
No. 452. Wild Oats (Revised)

Single copies of Advisory Leaflets, up to a maximum of six different leaflets, may be obtained free from the Ministry (Publications), Government Buildings, Tolcarne Drive, Pinner, Middlesex. Copies beyond this limit must be bought from Government Bookshops (addresses on p. 48), price 4d. each (by post 7d.). Other publications are obtainable from Government Bookshops, from Divisional Offices of the Ministry or through any bookseller.

Supported by a grant awarded by the U.S. Feed Grains Council, the Glasgow University Veterinary School has been investigating how feeding of in-wintered ewe hoggs can be economized while producing a liveweight gain of 20 lb

Maize-rich diets for in-wintered ewe hoggs

R. G. Hemingway

GOOD quality away-wintering for six months at grass for ewe hoggs may cost as much as 45*s.* to which of course must be added transport costs. In-wintering has to be done at a lower figure for food because of the housing costs. One system widely advocated, costing some 32–35*s.* but for only a five month feeding period is based on an allowance of 1–1¼ lb of hay and 4–6 oz of concentrates per day. This should achieve a liveweight increase of some 5 lb over the winter. But whilst this may compare satisfactorily with rather indifferent grass wintering, many farmers would look for an increase of some 20 lb in the live weight of hill ewe hoggs during the period October to late March.

Economy in food costs may be made in a variety of ways. Oat straw, if of good quality, might for example be substituted for hay, simple home-mixed rations can be introduced, and forward buying of hay and cereals before the winter and consideration of relative prices of mineral and vitamin supplements are all well worth while thinking about.

Blackface ewe hoggs housed at the Glasgow Veterinary School were fed diets composed of either oat straw or hay, plus concentrates consisting essentially of maize and fish meal alone or in combination with oats. Growth rates were also compared between a total of 48 housed hoggs and some 130 comparable sheep from the same flock away-wintered at grass during the relatively mild winter of 1963–64.

Maize-rich diets

We tried out three main types of maize ration:

(a) Oat straw *ad lib.* (about 1 lb) + ¾ lb kibbled maize

(b) ¾ lb hay + ¾ lb kibbled maize

(c) ¾ lb hay + ¾ lb of a mixture of equal parts of kibbled maize and crushed oats

To increase the protein content of the cereal ration, fish meal was added to all three mixtures at rates of either 3½ or 7 per cent. Fish meal is a source of concentrated protein which can, if required, be added to the maize in small quantities daily without the need for prior mixing. But in spite of the fish meal addition, such diets would still be very low in calcium, other minerals and vitamin D. A suitable mineral/vitamin D mixture (Minsal Ltd.) was therefore added at 2 per cent to all six concentrate mixtures.

The table on page 35 shows that the cost of the various rations ranged from about 40*s*. to 50*s*. over the full six-month period. The ingredient costs adopted were: crushed oats £20, kibbled maize £25, fish meal £65, mineral/vitamin D supplement £30. Oat straw has been costed at £4 10*s*. (home-grown) or £8 (purchased) and hay at £9 (home-grown) or £14 (purchased). It is clear that small variations in food costs are of critical importance. If values of £4 10*s*. and £9 are adopted for straw and hay respectively, then wintering can be achieved for about 40*s*. using either straw and maize (3½ per cent fish meal) or hay and the oats/maize mixture (3½ per cent fish meal).

Housing

The six groups of eight ewes were housed from early October until the end of March in concrete-floored pens inside an open-ended Nissen-type hut. Ventilation was fully adequate and there were no signs of pneumonia. The hoggs were bedded on wheat straw. When first housed they were initially offered hay *ad lib.* and about ¼ lb of concentrates per day, changing slowly to the experimental rations over about ten days. Hay and straw were fed from Norwegian-type hay boxes, allowing 12 in. per head. This eliminated much wastage and kept the fleeces free of hay seeds. Concentrates were fed twice daily from troughs, allowing 13½ in. per head. Water was freely available.

During the first few weeks the hoggs were run at regular intervals through a footbath containing formaldehyde. The feet were in good condition when the hoggs came in and, with regular paring, stayed healthy throughout the six-month period.

A group of hoggs taking oat straw from a Norwegian-type hay box. The feeding arrangements were inside each pen and the hoggs were bedded on wheat straw

Steady gains

The hoggs weighed an average of 51·2 lb on housing in early October and gained weight steadily throughout the winter period. The final mean live weight was 72·2 lb. This compared very well with the final weight of similar hoggs at grass, which was 72·5 lb. However, the sheep at grass had been a little heavier in early January.

The winter of 1963–64 was particularly mild and in consequence the weight gains of the hoggs wintered at grass were optimal. In a more severe winter, considerably reduced weight gains might be expected. One of the advantages of in-wintering is that the results achieved should be independent of climatic conditions. Under some circumstances (as in a good autumn) some economy might be achieved in in-wintering costs by shortening the period of housing.

There was no consistent advantage in feeding 7 per cent fish meal in the maize or maize/oats mixtures compared with 3½ per cent fish meal. The groups fed hay and kibbled maize were slightly superior to those fed the maize/oats mixture or those fed kibbled maize and oat straw. Nevertheless all three types of ration gave very satisfactory performances, and there might be possibilities of using increased quantities of these rations for intensive fattening.

All in-wintering systems for ewe hoggs involve feeding below appetite. There is thus severe competition for food which cannot be avoided by increasing trough length. For larger group feeding, it would be essential to segregate smaller hoggs and shy feeders from the rest of the flock. Attention must also be given to the allocation of hay. For maize-rich diets, at least ¾ lb hay or straw must be eaten per day. In other work with similar rations but where only ⅓ lb per day was offered, the hoggs quickly lost condition and refused to eat concentrates. Where maize forms such a major component of the diet it appears to be desirable to use it in kibbled or coarsely ground form rather than as a fine meal.

The ewes were housed in open-ended Nissen-type huts. To allow through ventilation, the rear walls were only partially bricked up

Back to the hill in good condition

On return to the hill in early April there was no noticeable loss in condition of the housed hoggs. Their grazing behaviour and distribution on the hill was similar to that of grass-wintered hoggs. In late June the housed and away-wintered groups weighed 89·5 and 91·0 lb respectively. But the housed hoggs had rather smaller fleece weights (3 lb 13 oz, compared with 4 lb 5 oz); they were, however, much cleaner. Faecal egg counts showed similar low worm burdens for both groups.

THESE ARE THE FIGURES
(8 hoggs per group)

	Fish meal	*Cost*		*Mean live weight*		
	%	*(per 6 months)*		*6th Oct.*	*6th Jan.*	*30th Mar.*
		Home-grown hay and straw	Purchased hay and straw			
Oat straw (*ad lib.*)		*s. d.*	*s. d.*			
¾ lb kibbled maize	3½	39 10	45 7	51·1	58·8	70·5
	7	40 11	46 8	52·0	58·5	72·6
Hay ¾ lb						
¾ lb kibbled maize	3½	43 5	49 6	50·5	61·1	72·5
	7	44 6	50 7	51·3	62·8	75·5
Hay ¾ lb						
¾ lb kibbled maize + crushed oats	3½	40 2	46 3	51·1	60·9	71·4
	7	42 8	48 9	51·4	59·3	70·7
48 housed hoggs (mean)				51·2	60·2	72·2
130 hoggs at winter grazing (mean)				51·7	63·4	72·5

R. G. Hemingway, M.Sc., Ph.D., has, for the past four years, been Senior Lecturer in Animal Husbandry and Preventive Medicine at the University of Glasgow. Previously he was Lecturer in Agricultural Chemistry at the University and at the Royal Agricultural College, Cirencester. He is engaged in a variety of work concerning the effects of faulty nutrition on the health of sheep.

24. East Huntingdonshire

J. P. Walker

EAST Huntingdonshire is on the boundary between the clays of the Midlands and the alluvial soils of the great plain that lies south of the Wash. There has been practically no industrial development, consequently there are no large towns and the population is as sparse as anywhere in England. The average annual rainfall is 22 inches.

Oxford clay underlies the whole district but is not often exposed on the surface. It is capped with boulder clay in the south and west, this area being known locally as the 'highland'. This is because of the marked contrast with the fenland occupying the remaining half of the district, though the greatest height above sea level is a mere 130 ft.

The highland is a gently undulating region of heavy alkaline clay, inherently fertile, but with poor natural drainage. Farms are relatively large. Traditionally, it has been an area of mixed arable and stock farming. Today, with plenty of machine power available and improvements in drainage, all but the most intractable fields are under the plough and there are very few dairy herds. Because of the heavy soil and labour difficulties, the growing of potatoes and sugar beet has declined and is now confined to farms where the soil is most suitable. Wheat and barley are the major crops and their acreage has been rising steadily. Beans, rape seed and red clover provide an occasional break from corn. The Ouse valley cuts across the southern end; here there are areas of river gravel and the ancient market town of St. Ives. On the lighter land north of the river there is a considerable acreage of old plum orchards, often inter-cropped with gooseberries. There are more recent plantings of apples, and some strawberries are grown.

In the north and east of the district is the Huntingdonshire fenland. Here the Oxford clay lies deep below a soft marine clay and on top is a layer of peaty soil of very variable depth and texture. This is a flat, treeless landscape, carved up into rectangular fields by drainage dykes, with not a hedge to be seen. It is new land. For centuries it was a place of reed beds, wild fowl and fish, of shallow lakes and meres, interspersed with islands of slightly higher ground whose inhabitants, weakened by malaria and opium, eked out an an existence by fowling, fishing and farming the drier parts.

The potential of these organic soils has long been recognized and there have been piecemeal attempts at drainage. To banish the risk of flooding throughout the thirteen hundred square miles of fenland, a comprehensive plan was essential. Work was begun on Vermuyden's drainage scheme in the seventeenth century but the last mere was not drained until 1852. Drainage has brought its own difficulties. As the peat has dried out it has shrunk, and the surface level has fallen so that all drainage water has to be pumped into the main watercourses.

The whole area is intensively farmed. The main crops are sugar beet and potatoes, each occupying just under a quarter of the land area, and wheat, mainly winter-sown, accounts for one third of the acreage. Another important crop is carrots, and small quantities of onions, parsnips, beetroot and celery are grown on some farms. Chicory is grown on contract for a factory at St. Ives, where the roots are processed for the production of a coffee substitute. There are limited areas of light black peats overlying up to fourteen feet of raw peat, ideal for celery and carrot growing. But if dry soil and strong winds coincide just after spring sowing, top soil and young plants can be swept up in a swirling dust-storm until they come to rest in the dykes.

In the past the peat has, in some places, been cut for fuel, so it is not surprising that great care has to be taken to avoid the land itself from catching fire. The light peats are often very acid and need heavy and frequent applications of lime. Crops grown on some of the peats can suffer from copper deficiency unless this is prevented by the soil application of copper salts or the foliar application of copper sprays. However, the majority of the fen soils in this area contain a considerable proportion of mineral matter and are usually alkaline in reaction. Manganese deficiency is frequently a problem, but can be corrected by the application of foliar sprays of manganese sulphate; soil application has not proved effective.

Intensive cropping brings its own problems. Potato root eelworm and sugar beet eelworm became widespread before they were recognized. The strict control of rotation under the Sugar Beet Eelworm Order has effectively countered the latter, but potato root eelworm is still a worry, particularly on the lighter soils. It is a pecularity of the fens that heavy egg-laying by wheat bulb fly occurs in potato crops, and this probably accounts for the normal practice of following potatoes with sugar beet rather than winter wheat. In the last year or two the acreage of potatoes lifted by complete harvesters has risen dramatically as a result of the increasing scarcity of casual labour.

With the exception of pigs, livestock are relatively unimportant and few yarded cattle are now kept. Owing to the instability of the peat, most farm buildings are of timber-frame construction and dwelling houses tend to be concentrated on areas of mineral soil where foundations and fresh water present less of a problem. Ramsey, Warboys, Somersham and Chatteris (just over the county boundary) are examples of such dormitory sites. Farm size is relatively small, exemplified by the large numbers of County Council holdings in the thirty- to forty-acre range. New ideas are seized upon avidly in this area of high farming. Rent, wages and machinery, gross output and profit, are each, on a per-acre basis, double the corresponding figure for the clay-land farms. With cultivation and drainage the peat is gradually and inevitably wasting away, but the fenman adapts his farming methods to suit the changing conditions—so far, with remarkable success.

H. CARTWRIGHT
Agricultural Land Service, Reading

Planning Improvements

A MAN may have had an idea at the back of his mind for a long time—for months or even years—that he ought to improve his fixed equipment but, when he reaches the stage of deciding that he must do something about it, he may easily underestimate the difficulties and the time that it will take to translate his idea into a completed building, ready for use.

This is the time when really careful planning is needed and when it may be particularly helpful to consult a qualified and experienced adviser. The professional staff of the A.L.S. is available, in a purely advisory capacity, to guide both owners and occupiers and their professional consultants on all aspects of capital investment in new or improved buildings and fixed equipment.

What are the things which have to be considered and on which this consultation is likely to prove helpful? The first test for any proposed improvement in fixed equipment should be farm policy. The only function of farm buildings should be to protect and facilitate a farming process—sometimes more than one. The man contemplating a capital improvement should, therefore, first make sure that his farming policy is right; that the technical process he proposes to carry out in his new building fits in with that policy; that it is sound and economical; and that he is not likely to want to change it in a short time.

Having cleared his mind on this, he should consider his need for capital, the proper management of which is often neglected. Cost, source of capital, interest charges, effect on income tax position and availability of grant, are important considerations. So, also, are the expected life of the improvement before it needs to be replaced—more probably because it will be out-dated by new ideas rather than because the building itself will be worn out—and when the increased returns from the improvement are likely to exceed the interest payments on the capital and, finally, pay back the capital itself. If the improvement requires the investment of a lot more working capital, this must be included in his calculations and he would be wise to ask himself whether

it would be better to put the money, or some of it, into livestock or machinery and, by modifying his plans, perhaps avoid a major capital investment in buildings altogether.

The siting of the proposed improvement, and the planning of the best and most labour-saving layout in relation to the existing features on the farm, may need a good deal of amateur if not professional 'work study'. Time spent on this may well save countless man-hours in future years. Thought must be given to the labour needed for the actual construction. Who will do the work? Will it pay to do anything with his own men? Often several firms will be involved for frameworks, builder's work and equipment.

Time is another essential element. For instance, there is nothing more frustrating than to plan to use a new grain storage plant for the coming harvest only to find that it is not ready! Many people do not realize what delays and complications can arise with building schemes. With a fairly complex scheme, such as a new yard and parlour or grain storage buildings, there is firstly the period when the would-be improver is thinking about his idea. He may perhaps consult experienced farmers and the A.L.S. about it and go to see examples of similar improvements at other farms. It is most important that time should be spent in this way.

Then there is the period from the date when the improver first takes positive action by asking a professional man to deal with the matter for him, until work is actually started. Plenty of time should be allowed for this to cover discussions with all concerned, preparation of detailed plans and specifications, the obtaining of tenders, planning and other consents if necessary, and approval of the final scheme for grant and for a loan if one is required. Allowing for some delay before the contractor can actually start work, all this may well take about six months.

Even when work is begun, a job seldom runs smoothly from start to finish. Delays due to bad weather, late delivery of materials, variation of plans, etc., occur with most major schemes. From three to four months should normally be allowed for this stage of work in progress.

The time taken by every scheme varies and no set of timings can be regarded as typical, but as indicated above, nine months to a year is none too long to allow for the planning and construction of an improvement of average complexity where no major or unusual difficulties arise. Where they do, it may be much longer.

The above considerations leave us with these few maxims for the better planning of improvements:

> Start with farm policy. Only if the farm policy requires it, is a fixed equipment improvement necessary.
>
> Make sure it is not only a desirable thing but also that it is economically sound and will pay its way. Don't do it if your money could be better spent in other ways or if it will hang a millstone of excessive capital cost around your neck.
>
> If you need advice, get the best professional help you can.
>
> Finally, don't forget the timing of the whole operation and allow a good margin for unforeseen delays.

IN BRIEF

Marketing Home-grown Cereals

The Cereals Marketing Bill, the text of which was published on 3rd December, is designed to give effect to an agreement reached with the farming and trade interests in September on a plan to create a marketing organization for home-grown cereals. The Bill provides for the setting-up of a Home-Grown Cereals Authority for the United Kingdom aimed at improving the marketing of home-grown cereals.

The Ministers would appoint the members of the Authority, 21 to 23 in all; 3 to 5 to be independent, 9 to represent the interests of growers and of farmer-users of cereals and 9 to represent the interests of dealers in and processors of home-grown cereals.

The Authority would have power to submit schemes for Ministerial approval by which financial incentives would be made available to encourage the better phasing of grain from farms throughout the cereal year. These would include schemes for bonus payments to growers who had entered into forward contracts with the trade for the sale of cereals (i.e., contracts where there was at least one clear calendar month between signature and delivery). As soon as practicable after their establishment the Authority would be required to submit a scheme (or schemes) covering wheat and barley throughout the United Kingdom. The Authority would have power to assist in providing credit for growers who had entered into forward contracts, either by including in the schemes for bonus payments on forward contracts provision for the making or guaranteeing of loans by the Authority themselves and/or arranging for other institutions to make or guarantee loans. The Authority would also have power to submit schemes for bonus payments to growers in respect of cereals delivered at particular times of the year irrespective of the form of contract.

Other non-trading powers that would be available to the Authority would include:

those to develop a market information service, for which data would be obtained and published about supply, demand, prices and other market conditions. The Authority would also be empowered to publish recommendations as to prices which would be appropriate in selling home-grown cereals;

those to encourage the improvement and standardization of forms and procedures used in cereals marketing;

those to encourage research, experiments and demonstrations in connection with the storage and physical handling of home-grown cereals and any new uses for such cereals.

Trading powers

The Bill provides that if, after representations from the Authority, Ministers are satisfied that trading powers are required to fulfil the better marketing of home-grown cereals, they may make an Order conferring such powers on the Authority. This would be subject to the approval of Parliament. By conferring trading powers, the Authority would be enabled to buy home-grown cereals in either or both of the following ways:

(i) to buy 'spot';
(ii) to buy on forward contract for delivery at times when in the opinion of the Authority home-grown supplies would otherwise be inadequate.

There would be two major limitations on the use of these trading powers. First, the Authority would not be able to buy until the market price of a particular cereal had fallen below a base price representing the ex-farm equivalent of the minimum import price of the cereal in question. Secondly. the Authority would be required to sell any cereals they had bought in a particular cereal year for delivery not later than one month after the end of that year.

Financial arrangements

Under the Bill the Minister would have power to make contributions towards the Authority's expenditure on their non-trading functions other than on bonus payments, loans and loan guarantees. The main source of income to the Authority would be a levy on cereal growers. The Bill provides that after considering the Authority's estimates, Ministers would determine the amounts to be raised by levy in any year. Their decision would be embodied in an Order setting out the rate of levy for each cereal and showing separately how much was attributable to the non-trading functions and the trading functions if any.

The normal method of collecting the levy would be by deduction of the levy from the cereal deficiency payments to growers. The Bill sets out the machinery for this and also provides for the alternative method of the Authority collecting the levy direct from growers.

Pig Breeding in the Future

SIR RICHARD VERDIN

Does the future of pig breeding in Britain lie in a 'poultry-type' industry with a small number of breeders controlling a large proportion of the market? Sir Richard Verdin, Chairman of the Pig Industry Development Authority, spoke about this at a recent conference. He said that many pig producers are asking how far the present marked trend towards more intensive, larger-scale production would develop.

'More pigs are being kept on fewer holdings', he said. 'Between 1960 and 1963 the number of holdings with pigs in England and Wales dropped by more than 8,000, but the average number of pigs on each holding rose from 39 to 51. In 1960 about 13 per cent of the pigs in England and Wales were in herds of 500 and over. By 1963 this figure had risen to 18 per cent.

'There are no indications', said Sir Richard, 'that these trends are slowing down, although both the co-operative method and the group approach are probably doing much to improve the position of the smaller man—particularly the weaner producer. There are considerable economic advantages in units large enough to enable the best use to be made of available manpower, but of course it is as big a mistake to stretch that manpower beyond its capacity as it is to under-employ it'.

Sir Richard said that, while there could be no direct comparison between the poultry and pig industries, they did have some points in common. Profits in each depend on careful husbandry and on continuous development based on genetic

improvement. So far as good husbandry in the pig industry is concerned, he had no doubt that it would continue to be of primary importance.

Obviously the problems involved in applying genetics to poultry and pig improvements are different. Great progress has been made in the production of improved poultry because a very large-scale breeding programme can be concentrated on one holding. But the capital costs of breeding fowls and female pigs are vastly different. Again, although the pig's generation turnover is less than in other classes of livestock, it is still only half that of poultry.

The most dramatic improvements in poultry have been achieved by hybridization, and Sir Richard thought that the hybrid pig might make a comparable contribution to the pig industry—but only if the hybrids or cross-breds are produced from pure-bred strains which are the product of selection based on repeated testing.

'We believe', said Sir Richard, 'that PIDA's testing facilities provide a necessary means through which co-operating breeders can carry out the programme of intensive selection that is needed. Most of the facilities at our testing stations will in future be concentrated on Accredited and Elite herds. The Elite herds will do the intensive selection and the Accredited herds will multiply the improved stock for the industry as a whole. These herds will not only provide improved pure-bred boars for use throughout the whole industry. They will also provide high-quality breeding females. Boars and gilts of tested strains will be available to the specialist producer who wishes to produce cross-bred animals for sale to the commercial producer.'

Animal Disease Surveys: Cows, Sheep and Pigs

The third report in the series of surveys carried out by Animal Health Division of the Ministry of Agriculture, Fisheries and Food, in collaboration with the Department of Statistics, Rothamsted, is in four parts.*

The first deals with the replicate survey of *disease, wastage and husbandry in the British Dairy Herd*, carried out during 1958-59 on a different sample of herds from that used in the original survey on this subject during 1957-58. The report of this survey is quite short, since the results of the two surveys showed a close similarity; only the differences are recorded.

The second survey is concerned with *losses in breeding ewes* over a period of one year. Determination of the actual causes of loss was impracticable. The heaviest losses were recorded during the winter months and obviously a fair proportion would have been due to defective nutrition, although the main losses were in areas below an altitude of 950 ft.

The third survey is an analysis of the causes of *loss among sheep* examined at Veterinary Investigation Centres between November, 1959, and October, 1961. It appears that there has been a steady increase in the number of sheep examined at these centres, although this does not necessarily mean that diseases of sheep are on the increase. It may mean, indeed, that more farmers are taking advantage of the investigation facilities provided by the Ministry. Although the results do not necessarily reflect the position all over the country, they certainly are a useful guide to the relative importance of many diseases of sheep. Although some of the diseases recorded present difficulties in control or prevention, there are others for which there are well-established preventive measures.

The fourth survey deals with *atrophic Rhinitis in swine*, following its recognition in imported pigs in 1954. Rhinitis was known to occur in Britain but not in the atrophic form, and an Order was made to provide for slaughter, with compensation, of affected and contact swine. After some time it became apparent that further slaughter was not likely to cause improvement in the situation and the Order was revoked.

*H.M.S.O., price 8*s.* 6*d.* (by post 8*s.* 11*d.*)

Books

Biological Control of Insect Pests and Weeds. Edited by PAUL DE BACH, assisted by EVERT I. SCHLINGER. Chapman and Hall. £6.

This book comes at a time when official action is being taken in many parts of the world to control the use of highly toxic or highly persistent insecticides; at a time when insecticide resistance is already posing serious problems; and at a time when applied biologists generally are turning away from sole dependence on chemicals and towards forms of 'integrated control', in which chemicals are used minimally and in harmony with all those other 'natural' control factors which keep insect populations at a low level most of the time.

In these circumstances a less authoritative, or less comprehensive, book would find many readers even if it was not a 'must' in all technical libraries. A 'must' is undoubtedly what De Bach and his colleagues have produced; a book should be good after a thirty-year gestation period, and this is.

The book is set out in eight sections, each dealing with a major facet of biological control in the wide sense and each divided into two or more chapters written by an appropriate specialist or specialists. The Introduction discusses the place of biological control in relation to natural balance, and summarizes the basic principles of the technique. Doutt follows with a concise and readable summary of the history of biological control since 1762, when the mynah bird was introduced from India to Mauritius to control the red locust.

The second section, by Huffaker and Messenger, and Doutt and De Bach, discusses the ecological basis of biological control. That on quantitative population ecology and modern concepts of natural control is quite the best of several reviews which have appeared in recent years.

Section III, concerned with biology and systematics, is a much shortened version of the well-known book, *Entomophagous Insects*, written by C. P. Clausen (McGraw-Hill, 1940), who was one of the initiators of the present book at its conception thirty years ago. Doutt, Hagen and Schlinger have, of course, brought 'Clausen' up-to-date in the process.

The fourth section describes in detail the steps involved in searching for possibly beneficial organisms in overseas territories, the quarantine, culture (including nutritional problems), and subsequent release, of potentially useful species. There are many useful illustrations of the kinds of apparatus which have been found most efficient in these operations.

With the introduced species safely installed in its new habitat, it is necessary to ensure that the task for which it was introduced is being done. Section V is accordingly devoted to the conservation and augmentation of natural enemies. It deals with the manipulative techniques which can be used with natural enemies (inundative and inoculative releases of the enemies with, and without, additional prey as a temporary support); the techniques of environmental modification; and techniques of integrated control whereby chemicals are used with minimal damage to beneficial insects.

Microbial diseases of insects, their epizootiology, the mass production of insect pathogens and their use in pest control are discussed in Section VI.

In Section VII attention is directed to the biological control of weeds: classical examples are discussed and careful consideration is given to the question of host specificity. It is completed by a most useful chapter on weed species currently the subject of biological control attempts in various parts of the world.

The final section summarizes all the known cases of successful biological control, and concludes with a stimulating account of current trends and future possibilities. The bibliography contains over 2,500 literature citations (with titles), and forms a comprehensive guide to biological control work up to the end of 1961.

In coming to the end of this book I feel two slight regrets: that more prominence is not given to the Commonwealth Bureau of Biological Control and its work; and that the U.K. is not mentioned in the list of Biological Control Insectaries on pages 400–401, or in tables 12–14 (pages 676–693) which give comprehensive lists of world-wide attempts at biological control. Finally, there is an index of scientific names, but no general index: this is a need which should be met in the next edition of what is sure to become a standard work.

A.H.S.

Grasses and Grasslands. Edited by C. BARNARD. Macmillan. 50*s*.

It is a common practice nowadays, when a summary of present knowledge about a large or complex subject is envisaged, to commission chapters from experts in various branches of that subject. Although this team approach may be basically sound, the product is often disjointed, despite valiant efforts on the part of an editor. No such criticism can be levelled against *Grasses and Grasslands*, which the editor describes in his preface as 'a series of essays and documented essay-reviews on various aspects of the biology of grasses and grasslands upon which the contributors have been competent to write with special authority'.

A logical framework is apparent in the simple but well-chosen chapter headings. An essay on the historical relationships between grass, animals and man precedes nine chapters on the biology of grasses, covering systems of classification and world distribution of grass species, their form and structure (a text-book in miniature), germination, growth analysis, environmental control of growth, reproduction, cytogenetics and selection and breeding. The remaining four chapters deal with ecology and some important agronomic aspects—the evolution and distribution of grassland communities, their mineral nutrition, reaction to grazing, and function in soil conservation. A useful bibliography is appended to each chapter.

The various aspects are discussed in considerable detail, and each essay or review has clearly been written with reference to others. That the book emerges as an articulated whole, probably owes much to the fact that all the authors have been colleagues in one organization—the Division of Plant Industry, C.S.I.R.O., Australia. Perhaps for the same reason the ecological and agronomic section gives prominence to the problems of tropical and sub-tropical grasslands.

Grasses and Grasslands is a milestone in this field of science, bringing up to date much basic knowledge and research experience, to which, in the short space of thirty years, the Australian group have themselves contributed enormously. Teachers will find it invaluable, and it would not be surprising to learn, in due course, that any one of the essays in this book had decided a prospective research worker in his choice of subject. The language and terminology are those of the scientist, but non-specialists will find the evolution of knowledge, the ideas and perspectives all presented clearly and with commendable economy. *J.O.G.*

An Agricultural Atlas of England and Wales. J. T. COPPOCK. Faber and Faber. 63*s*.

In 1925 the Ordnance Survey published *An Agricultural Atlas of England and Wales* by J. Pryse Howell, and it was followed seven years later by a second edition by M. Messer. This pioneer work consisted essentially of a series of dot maps showing the distribution of the chief crops and stock. Those printed on transparent paper could be placed over basic maps of relief and any others which might be available on the same scale. Like the extensive studies of the Land Utilization Survey, which began its work in October 1930, and the map of Types of Farming based on farmers' principal sources of income, prepared by the Ministry of Agriculture (published 1941), the *Atlas* referred to the inter-war years when agriculture was a depressed industry. Thirty years later we all know that the position is utterly different; the new agricultural revolution is in full spate. The time is obviously ripe for a new agricultural atlas.

But in the meantime cartographical representation of data has also undergone a revolution, and there is not the slightest resemblance between Dr. Coppock's *Atlas* and its predecessors. What in fact he has produced is an account of present-day farming, with a major emphasis on crops, fully illustrated by no less than 205 black-and-white maps, all included in the text. Most of the maps are based on the agricultural census of the 4th June, 1958. Dot maps, in which each dot represents a certain number of acres or head of stock, have been almost entirely discarded in favour of choropleth maps (explained in Appendix I) in which intensity of production of a given crop is expressed in acres per thousand of crops and grass or similar standards. Such dot maps as are used—there is a good series for horticultural crops—mainly employ dots of graded size.

After describing his aims, sources and methods, preliminary chapters are devoted to the physical basis and man-made framework of farming, and we are at once impressed by the range and novelty of the many maps. The map of physical regions shows the major ones and also lists twenty-five in the uplands and eighty in the lowlands; the next pages showing the N.A.A.S. districts. Some of the maps are on a simple county basis—in the south-east more than 5 per cent of the farms in most counties are held by companies; in many counties, as diverse as Anglesey and Essex, more than 59 per cent of holdings are part-time. Most of the maps are in fact on a much more

detailed basis and it is literally impossible in a short review to do more than record the wealth of material in what must be regarded as a book of outstanding significance. It is appropriate that Mr. Sentance in Appendix II should deal with programming the computer and that Appendix III gives for the each of the 352 N.A.A.S. districts its essential features. It is to be hoped that the farmers of district 334 know that their crop combination is expressed as OKWPVBFTR, requiring 561 man-days per 100 acres with a livestock combination of CSfp!

L.D.S.

The Soils and Land Use of the District around Aylesbury and Hemel Hempstead. (Memoirs of the Soil Survey of England and Wales). B. W. AVERY. H.M. Stationery Office. 35*s*. (with map 42*s*.)

A welcome addition to the Memoirs published by the Soil Survey of Great Britain. The area described covers the Geological Survey Sheet 238 and includes parts of Buckinghamshire, Hertfordshire and Bedfordshire and three well-known scenic regions, the Vale of Aylesbury, the Chiltern Plateau and the escarpment between the two, the Icknield Belt. Rothamsted Experimental Station is just to the east, but the soils on which the well-known manuring experiments have been carried out are described and the extent of these soils to the west of Rothamsted can be seen on the map accompanying the memoir.

As the heavy soils of the Vale of Aylesbury, the chalks of the Icknield Way and the clay-with-flints of the Chiltern Plateau are much more widespread than in the area covered by this report, the information may be usefully extended to adjacent areas and to wherever similar geological deposits occur.

The text follows the pattern of previous memoirs. A general description of the area with an interesting account of landscape development precedes the chapter on soil formation, classification and mapping. An excellent coloured illustration showing the ten major types of soil does much to relieve and clarify the technical descriptions of soil profiles in Chapters III and IV.

Seventy soil profiles are described and many physical and chemical tests have been carried out on samples from each profile. To relate this data to the descriptions is very difficult, as it occurs on several separate pages. Why cannot all the information on one soil profile be brought together for convenience and comparison as done in some European reports? Physical measurements include particle size distribution but no information is given on other important characteristics such as available water capacity.

One of the most interesting and useful chapters deals with the soils in relation to agriculture and horticulture. Stoniness, drainage, land-use capability, management problems and fertilizer requirements are some of the factors discussed for each group of soils in the Chilterns and in the Vale of Aylesbury. Another chapter deals with forestry and covers the historical background as well as giving an account of the area, composition and present condition of the woodlands.

This book will be invaluable to those giving advice to farmers and growers in the area described, since a sound knowledge of soil capability must precede any comprehensive land management project.

While much of the information is technical, several sections are of general interest, particularly useful to agricultural students, farmers and indeed anyone with an interest in soil productivity or natural science.

T.B.

The Land. JOHN HIGGS. Studio Vista. 35*s*.

'Every picture tells a story'. More accurately, every *well-chosen* picture helps in the telling of a story. Mr. Higgs, who lectures in agricultural history at Oxford, has a good story to tell and great skill in choosing pictures which help to tell it. He has assembled a gallery of some 250 pictures and connected them with a substantial narrative and a running commentary of notes to illustrate the development of British farming from the Middle Ages to modern times. The result is a unique, fascinating and valuable book.

He starts with medieval drawings, manuscripts and photographs of medieval sites and survivals—including an agreeably incongruous helicopter round-up of cattle on Port Meadow, Oxford, by a sheriff who happened to be an Air Marshal—and takes us to the present day via a rich and varied assortment of photographs, paintings, maps and caricatures, many of which have never been seen outside libraries or museums. Every reader will have his particular favourites, but for historical interest it would be hard to beat the paintings of

Bakewell's ram-letting and the cattle grazing in Regent's Park in 1807; for charm of artistry, Stubb's harvest-scene; and for sheer delight, Cruickshank's cockney farmer and Grundy's Victorian poachers.

Such a visual history conveys impressions of our farming past beyond the power of the written word alone. But, unfortunately, only of the past; for the section on the post-war period is inadequate and disappointing. We are told about education and advice, about changes in rural life and the demands of modern society on our limited acres. But we are not told about technical development, about the increasing dependence of the farm on research centre, factory and warehouse, about the growing industrialization of farming and its effects on the farming structure; neither are we shown photographs of such contemporary realities as an artificial insemination centre, an agricultural laboratory, an atmospheric nitrogen plant, a lorry delivering feedingstuffs or a bull-dozer modernizing a field-system.

The rural reader may not need such reminders. But Mr. Higgs has missed a splendid opportunity of giving townsmen a literal picture of the modern farming industry and the pressures and trends which are causing such rapid changes in it. Indeed, by failing to do so he will confirm many in their existing prejudices and assumptions.

This weakness is obvious and curious. But it affects only one section of this otherwise admirable book. There are no others which so vividly illustrate the farming of this country down the centuries, and there can be few which offer such beautiful presentation and well over a hundred pages of excellently reproduced pictures for the price of this one.

N.H.

Tomato Growers Interests in a Western European Market. R. R. W. FOLLEY. Department of Agricultural Economics, Wye College. 6*s.* 6*d.*

This study from the prolific pen of Dr. Folley is to some extent complementary to his earlier works on tomatoes. He first examines the rapid growth in recent years of both the heated glass area and heated tomato growing in Holland. He concludes that new houses account for the bulk of the additional heated glass rather than the conversion of existing cold glass and that, with limited land, this expansion has taken place at the expense of the acreage under frames. The capital has mainly come from retained cash surpluses arising from the preponderance of family labour and higher market returns associated with stable overall costs.

Two of the reasons given for this dynamic expansion are the relatively high increase in demand for products from heated houses and the high marginal return on capital expended on installing heating systems.

The second section attempts to compare production costs of early tomatoes in Guernsey, England and Holland. Because of the paucity of information in this country and the wide range of costs in the few available studies, a cost accounting method was used.

Finally, Dr. Folley assesses the likely future demand, supply and prices for early tomatoes (April-June), using, in part, estimates made by the Agricultural Economics Research Institute at Oxford. The general assumption about a rising demand based on higher incomes and a larger population seems realistic, although the underlying demand for tomatoes, i.e., after allowances for price, income and population changes, is thought to be falling.

But when the current and future sources of supplies are being examined the analysis is much less convincing. The table on page 31 suggests that annual production of early-raised tomatoes in Spain and the Canary Isles is stationary at 140,000 tons. This figure is approximately that of exports, which have in fact increased, and represents less than one-fifth of total annual production; this has risen by 50 per cent in the last five years. Although much of this total production is outside the April-June period, there is clearly scope for some increase in exports. Moreover, several Eastern European countries are expecting to enter the early-tomato market in the next few years. If the potential supply position is rather more rosy than Dr. Folley suggests, then any prognostication on prices and profits may well be too favourable.

Although one may disagree with some of the author's forecasts this book is a praiseworthy attempt to marshal the various facts and figures likely to affect early tomato growers in the 'sixties. It should be read by all who are interested in the future development of this part of the horticultural industry.

A.M.C.

Experimental Farm Buildings Scheme, Report No. 1—Cow Cubicles. AGRICULTURAL RESEARCH COUNCIL. H.M. Stationery Office. 2*s.* 6*d.* (by post 3*s.*)

Under the experimental Farm Buildings Scheme the Agricultural Research Council makes grants, in approved cases, of up to half the agreed capital cost of erecting agricultural or horticultural buildings of an experimental type, on the condition that the recipients allow the Council to carry out investigations into the working of the buildings for a limited period.

This is the first report to be published of the results obtained in an experimental project carried out under the Scheme, and it describes the investigation which was made between autumn 1962 and spring 1964 to assess the suitability of cubicles as a system of loose housing for dairy cows. This formed part of the Council's experiments to find ways of economizing in straw and labour for cattle yards.

Information on costs and performance was obtained from seven different cubicle installations for herds ranging from 22 to 133 Ayrshire, Friesian and Ayrshire × Friesian cows. The report shows that the cost of installing cubicles with solid passageways in a suitable existing building without the provision of manure storage facilities was £3 10*s.* per cubicle. To erect a new building with slatted passageways and a manure cellar cost £54 per cubicle.

Labour requirements were low for littering the cubicles and cleaning the building and yards. Twelve pounds of sawdust per month for each cow was adequate for cleanliness and little time was required to wash udders before milking.

There were very few serious injuries. The cows were, in the main, willing to use the cubicles and appeared to be comfortable in them.

E.D.

Towards Better Marketing. Report on Proceedings of Course at Nottinghamshire Farm Institute 1964.

This is the record of an experimental seven-day course run by the Institute with the aid of an AMDEC grant. Some of our most knowledgeable speakers on marketing matters contributed, and the papers are now published with a summary note by the Director of Studies. The Institute's aim was to bring home to farmers something of the complexity of present-day marketing and particularly to take a critical look at ideas customarily held in the industry. If in practice the course attracted outside experts rather than producers, and if the amount of ground covered makes immediately for mental indigestion rather than understanding, it remains that the effort was well worth while.

The Report can now be studied at leisure. Some of the papers get down to cases in modest detail, but generally the speakers were concerned to outline their subjects and the nature of contemporary or possible developments. The resultant impression is of vast and surging movement—producers grouping, integrating, rationalizing; processors and distributors arranging contracts, amalgamating, setting up supermarkets; Governments subsidizing, controlling, liberalizing. And, by no means forgotten, in the middle of all this the consumer and the family farmer.

Some time back Mr. John Hare, as he then was, spoke of his hopes that traditional family farming would be maintained. In this respect the Report may leave the reader rather disconsolate. Do we have to look forward to a future of factory farm units integrated with feed producers, stock suppliers, etc., and under contract to sell pre-ordained produce to one of the few remaining and monolithic buyers? If this prospect with its Orwellian undertones worries you at all, or if you want starting-off ideas on your own marketing problems; if, indeed, you want to be 'with it' marketing-wise, you will find this Report informative and truly stimulating.

A.D.T.

The Development and Performance of the Herringbone Parlour, with Special Reference to Great Britain. P. H. EASTON and C. N. HARVEY. Agricultural Research Council. 2*s.* 6*d.* (by post 3*s.*)

The so-called herringbone type of milking parlour originated in New Zealand in 1953 and has now proved itself in Britain to be the best type in every way for herds of over 40 cows. Moreover, in this country it has been developed for the feeding of concentrates to cows which can be almost automatic. That was not the practice in New Zealand.

There is evidence that for a one-man herringbone parlour the best arrangement is to have either four or five milking units

in a double-sided layout. Such a parlour has the distinct advantage over other types that the throughput of cows per hour is greater because the udders are closer together.

Other advantages are that less time is spent on opening and closing gates; the cows generally are quieter; and it is easier to cope with slow milkers.

The alleged disadvantage that it is more difficult to keep an eye on each cow individually is not proven, and in practice the hazard that cows may dung and urinate into the operator's pit is far from serious.

The evidence referred to has been sifted from nearly one hundred world-wide references. These are listed in this booklet, which is Occasional Paper No. 1, published by the A.R.C. Farm Buildings Unit, Wrest Park Lodge, Silsoe, Beds.

N.K.G.

Agricultural Science

Girls and boys who wish to make a career in agriculture and have the necessary qualifications to enter a university will be interested in this useful booklet issued by Glasgow University.

Courses include those leading to the B.Sc. Honours degree in Agricultural Botany, Agricultural Chemistry, Agricultural Zoology, Agriculture and Agricultural Economics, as well as to the Ordinary degree in Agriculture.

The booklet is free from the University of Glasgow.

Received

Report of the Agricultural Research Council for the year 1962-63. H.M.S.O. 6*s.* 6*d.*

ACKNOWLEDGMENT OF PHOTOGRAPHS

We gratefully acknowledge permission to use the following photographs:

P. 1 Boots Pure Drug Co. Ltd. P. 3 Commercial Camera Craft. P. 5 *Farmer's Weekly* photograph by Peter Adams. P. 5 Cyril Thornber. P. 10 John Jenkins. P. 14 *Farmer and Stockbreeder*. P. 17 S. Robson. P. 21 John Topham Ltd. Pp. 33 and 34 Glasgow University Veterinary School.

Printed in England for Her Majesty's Stationery Office
by Hull Printers Limited, Willerby, Hull, Yorks.

(K112) 72-1-65-1

OFFICIAL APPOINTMENTS

OFFICIAL APPOINTMENTS *cont.*

ANIMAL HUSBANDRY OFFICER
SARAWAK

Required to develop the livestock industry dealing mainly with pig-feeding trials and management. Candidates must hold a degree in agriculture with extensive experience in practical animal husbandry, preferably with tropical livestock.

Salary, £1,680 to £2,905 a year, plus terminal gratuity. Government accommodation. Passages provided. Two to three year contract. Child Allowance. Education Allowances. Generous leave. Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write giving full name and brief particulars of qualifications and experience, quoting RC 213/155/06 to:

Appointments Officer,
Room 301,
Ministry of Overseas Development,
Eland House,
Stag Place, London, S.W.1

PUBLIC SERVICE OF TASMANIA — AUSTRALIA
DEPARTMENT OF AGRICULTURE
AGRONOMISTS

Applications are invited for appointment to several positions of Agronomist in the Department of Agriculture, Tasmania.

Location: Launceston, in the first instance.

Salary Range:

Class V	A£1,540—A£112—A£1,988 p.a. (three year Degree) A£1,652—A£112—A£1,988 p.a. (four year Degree)
Class IV	A£2,100—A£112—A£2,324 p.a.
Class III	A£2,436—A£112—A£2,548 p.a.

Commencing salary will be according to years of experience and will be payable from the date of embarkation for Australia.

Opportunities exist for advancement to higher posts.

Duties: To carry out field and laboratory research work in either the Pastures, Soils and Forage Crops section; the Potato section; the Cereal and Pulse Crops section or the Weed Control section of the Agronomy Division of the Department.

Qualifications: A degree in Agricultural Science, Science or an equivalent faculty.

Appointment at Class IV requires at least 4 years' and at Class III at least 7 years' experience since qualification.

Passages from the United Kingdom are provided under the Commonwealth Migration Scheme arranged through the Agent General for Tasmania.

Recreation leave, sick leave and long service leave are provided.

Superannuation is compulsory for permanent officers.

Applications in duplicate should be addressed to the Agent General for Tasmania, 457 Strand, London, W.C.2.